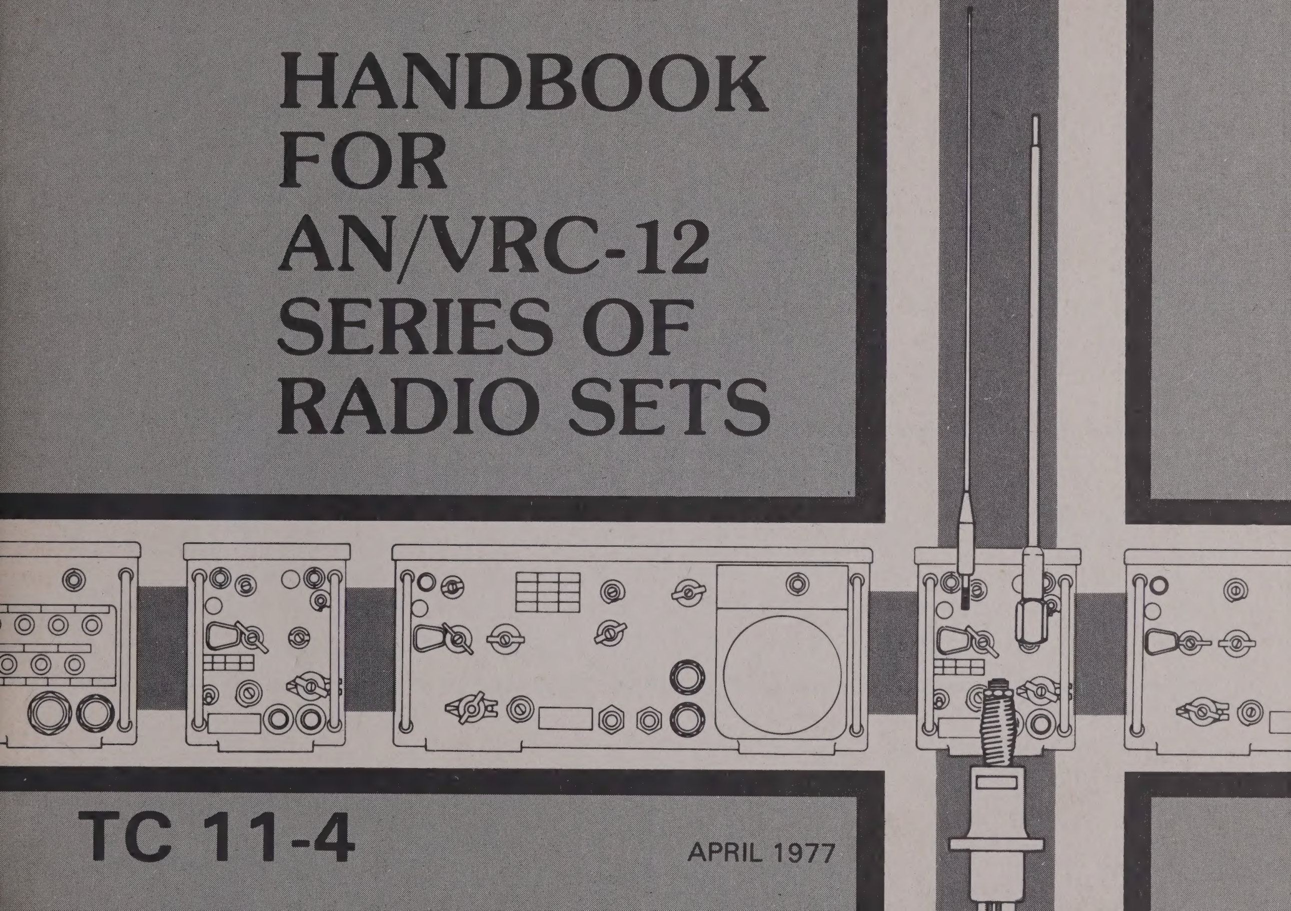
HANDBOOK FOR AN/VRC-12 SERIES OF RADIO SETS



TC 11-4

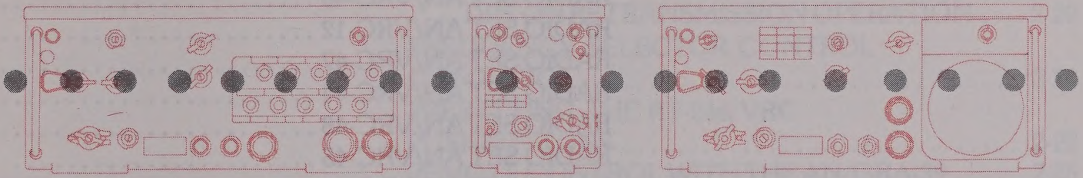
APRIL 1977

This training circular (TC) was prepared by the US Army Signal School to assist in training on radio sets of the AN/VRC-12 family. Your comments to improve the TC are requested and an addressed comment card is provided at the centerfold. You may also comment by letter with specific reference to the pages on which you are recommending changes. Address your comments to: Commandant, US Army Signal School, ATTN: ATSN-TD-LIT, Fort Gordon, Georgia 30905.

HANDBOOK FOR AN/VRC-12 SERIES OF RADIO SETS

INTRODUCTION

In tactical operations, the AN/VRC-12 family of radio sets is a primary means of communications. Actually, the different radio sets in the AN/VRC-12 family are based on common components which are combined in various ways or configurations. Depending on which components are used to achieve a desired capability, each radio set has a specific type number: AN/VRC-12 or AN/VRC-43 through AN/VRC-49.



The purpose of this training circular (TC) is to show you **which components are in each radio set and how they are connected.** There is also some other equipment that is not issued with the radio sets but that you need for certain sets like the AN/VRC-45. We'll show you the **extra equipment and how it connects to the radio set.** In addition, this TC includes the **operating procedures for each radio set and some troubleshooting tips for the operator.**

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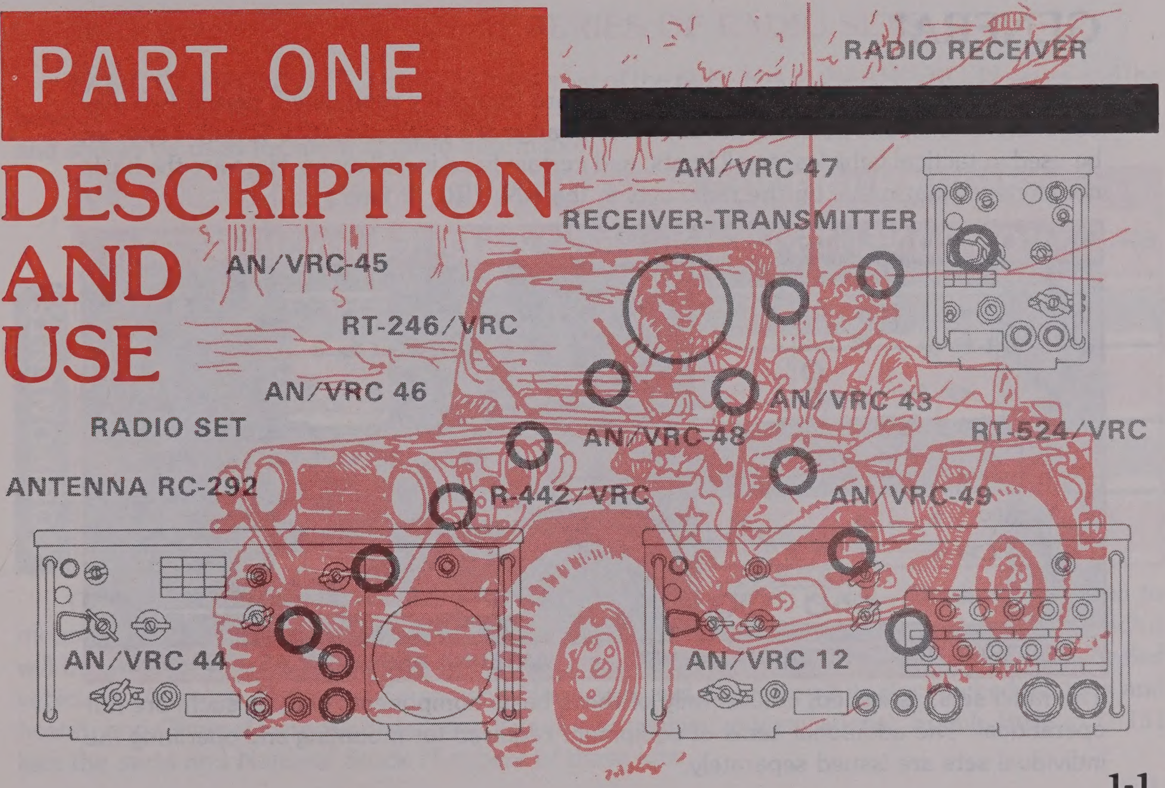
As much as possible, everything in this TC is in nontechnical language with a lot of illustrations. So even if you're not a trained radio operator, you should be able to understand it. Keep it handy and use it if you're having trouble operating your radio set.

Remember—using **proper operating procedures** is your best weapon to combat communications failures.

PART ONE

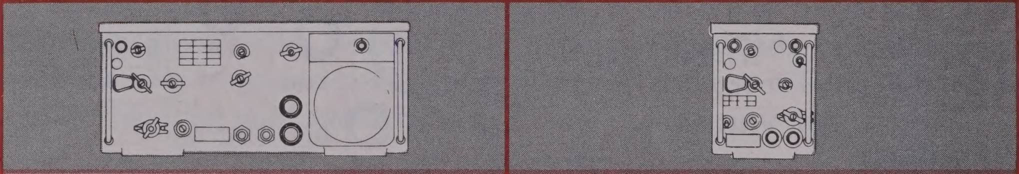
DESCRIPTION AND USE


RADIO RECEIVER
AN/VRC 47
RECEIVER-TRANSMITTER
AN/VRC-45
RT-246/VRC
AN/VRC 46
RADIO SET
AN/VRC 43
AN/VRC-48
RT-524/VRC
ANTENNA RC-292
R-442/VRC
AN/VRC-49
AN/VRC 44
AN/VRC 12

GENERAL

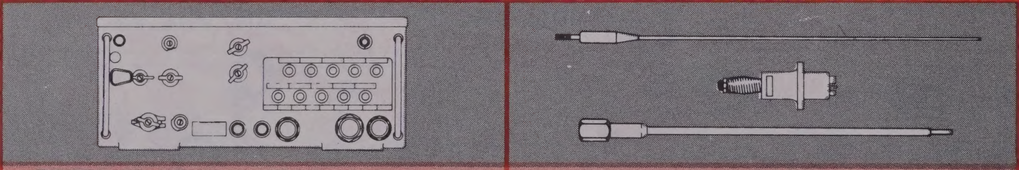
The radio sets in the AN/VRC-12 series are frequency modulated, permit two-way communications, and normally are limited to a range of 5 to 25 miles (8 to 41 km). They can be used in tactical vehicles, small boats, and certain fixed installations. Here are the basic components that make up the radio sets in the AN/VRC-12 family:

COMPONENTS OF AN/VRC-12 SERIES RADIO SETS



RECEIVER-TRANSMITTER RT-524/VRC

RADIO RECEIVER R-442/VRC



RECEIVER-TRANSMITTER RT-246/VRC

ANTENNA ASSEMBLY AS-1729/VRC

The radio sets, as issued, consist only of these basic components and, as such, are not operational. The additional items of equipment required for mounting and operating the individual sets are issued separately.

COMPONENTS OF AN/VRC-12 SERIES OF RADIO SETS

BASIC COMPONENTS. The following is a list of the radio sets in the AN/VRC-12 series and the basic components of each. Technical Manual 11-5820-401-12 is also a basic issue item for each radio set and should be used for more detailed information.

AN/VRC-12 SERIES BASICS CONFIGURATIONS

COMPONENTS

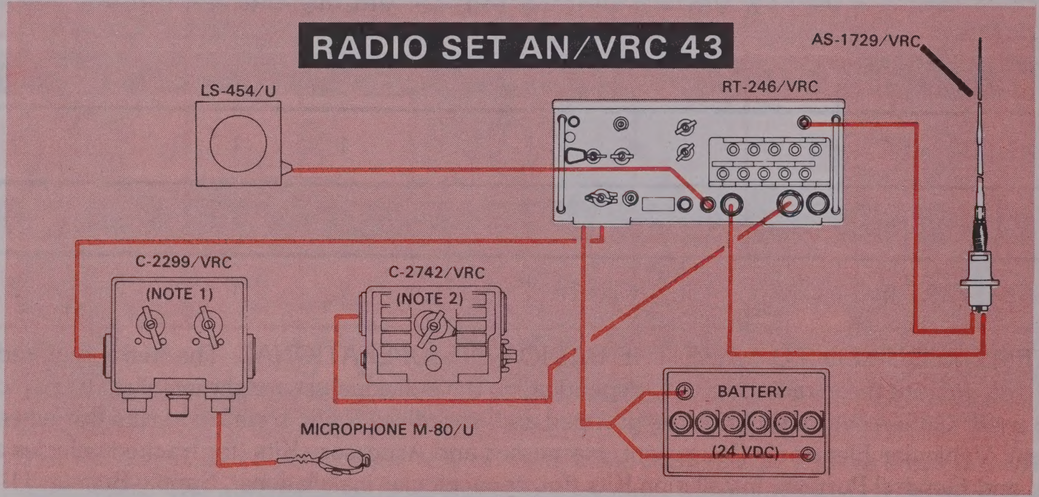
AN-	VRC-12	VRC-43	VRC-44	VRC-45	VRC-46	VRC-47	VRC-48	VRC-49
RT-246/VRC	1	1	1	2				
RT-524/VRC					1	1	1	2
R-442/VRC	1		2			1	2	
AS-1729/VRC	1	1	1	2	1	1	1	2

ITEMS REQUIRED TO MAKE THE RADIO SETS OPERATIONAL. The items required to mount and operate these radio sets vary depending on the individual set and the installation in which it will be used. Generally, these items are grouped and issued as: Radio Installation Kits (for wheeled vehicles); Vehicular Electronic Equipment, Harnesses and Accessory Kits (for tracked vehicles and boats); and General Purpose Installation Kits (for nonvehicular installations). Supply Bulletin 11-131 lists the parts and National Stock Numbers of these kits.

Note: The following diagrams show the basic components (white), the audio accessories, and other items interconnected in typical installation. Mountings for Receiver-Transmitters RT-246/VRC and RT-524/VRC and Receiver R-442/VRC are not shown in the diagrams, but are required for normal operation. (See inside back cover.)

RADIO SET AN/VRC-43

This radio set operates in one radio net at a time.


RADIO SET AN/VRC 43
AS-1729/VRC
LS-454/U
RT-246/VRC
C-2299/VRC
(NOTE 1)
C-2742/VRC
(NOTE 2)
BATTERY
(24 VDC)
MICROPHONE M-80/U

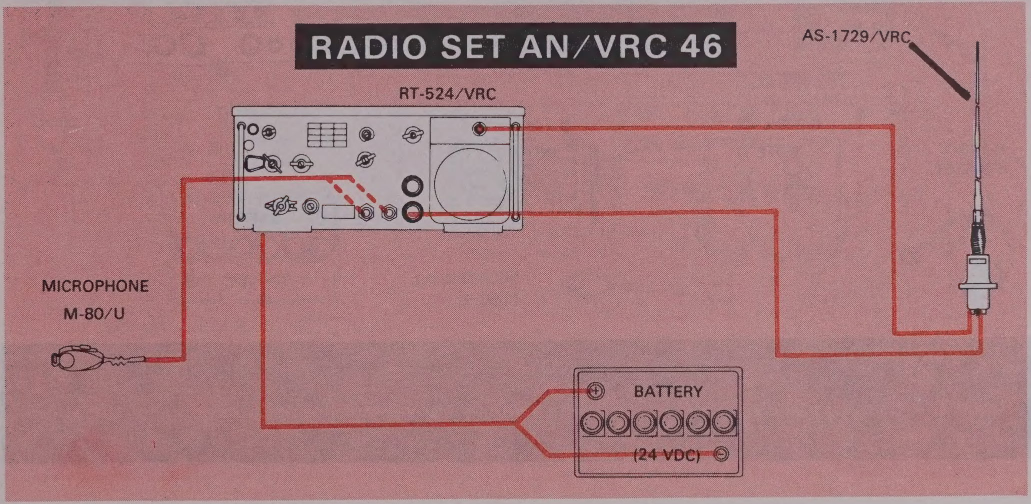
NOTES

1. Radio Set Control C-2299/VRC (optional) provides a convenient connection point for the audio accessories.

2. Frequency Selector Control C-2742/VRC (optional) provides a means of remotely tuning the receiver-transmitter RT-246/VRC.

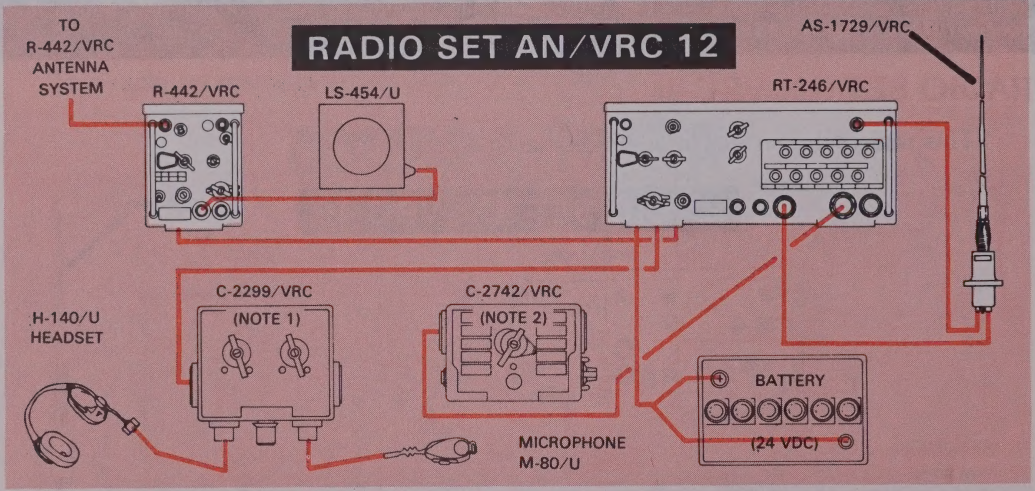
RADIO SET AN/VRC-46

This radio set operates in one radio net at a time.


RADIO SET AN/VRC 46
AS-1729/VRC
RT-524/VRC
MICROPHONE
M-80/U
BATTERY
(24 VDC)

RADIO SET AN/VRC-12

This radio set operates in two radio nets at the same time. The radio receiver monitors one net while the receiver/transmitter operates in another.


RADIO SET AN/VRC 12
TO R-442/VRC ANTENNA SYSTEM
R-442/VRC
LS-454/U
AS-1729/VRC
RT-246/VRC
C-2299/VRC
(NOTE 1)
C-2742/VRC
(NOTE 2)
H-140/U HEADSET
BATTERY
(24 VDC)
MICROPHONE M-80/U

NOTE 1.

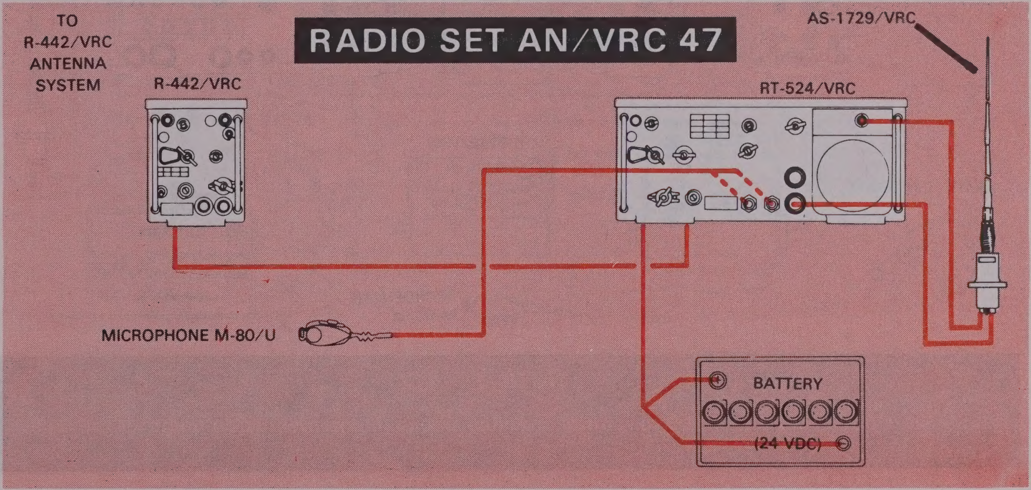
Radio Set Control C-2299/VRC (optional) provides a convenient connection point for the audio accessories.

NOTE 2.

Frequency Selector Control C-2742/VRC (optional) provides a means of remotely tuning the receiver-transmitter RT-246/VRC.

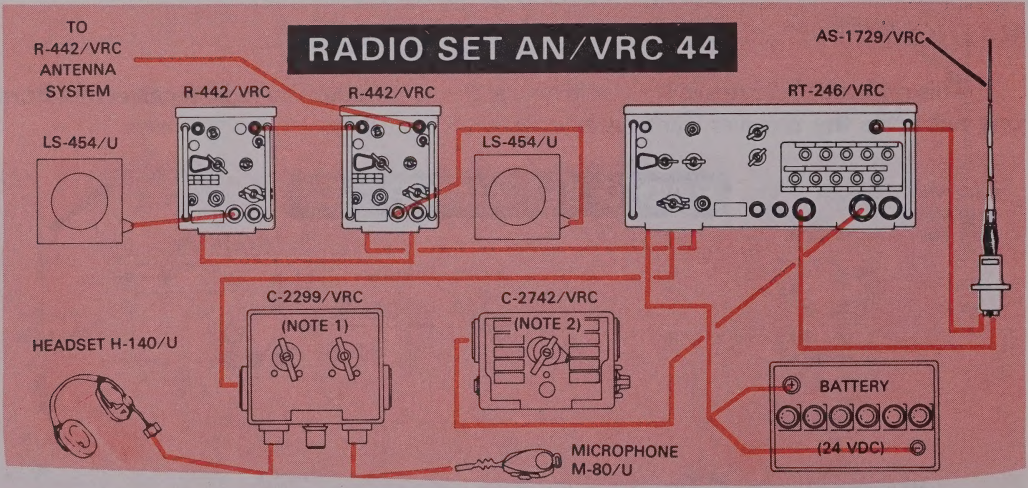
RADIO SET AN/VRC-47

This radio set operates in two radio nets at the same time. The radio receiver monitors one net while the receiver-transmitter operates in another.


RADIO SET AN/VRC 47
TO R-442/VRC ANTENNA SYSTEM
R-442/VRC
AS-1729/VRC
RT-524/VRC
MICROPHONE M-80/U
BATTERY
(24 VDC)

RADIO SET AN/VRC-44

This radio set operates in three radio nets at the same time. The radio receivers monitor two separate nets while the receiver-transmitter operates in a third.


RADIO SET AN/VRC 44
TO R-442/VRC ANTENNA SYSTEM
R-442/VRC
R-442/VRC
RT-246/VRC
AS-1729/VRC
LS-454/U
LS-454/U
C-2299/VRC (NOTE 1)
C-2742/VRC (NOTE 2)
HEADSET H-140/U
BATTERY
(24 VDC)
MICROPHONE M-80/U

NOTE 1.

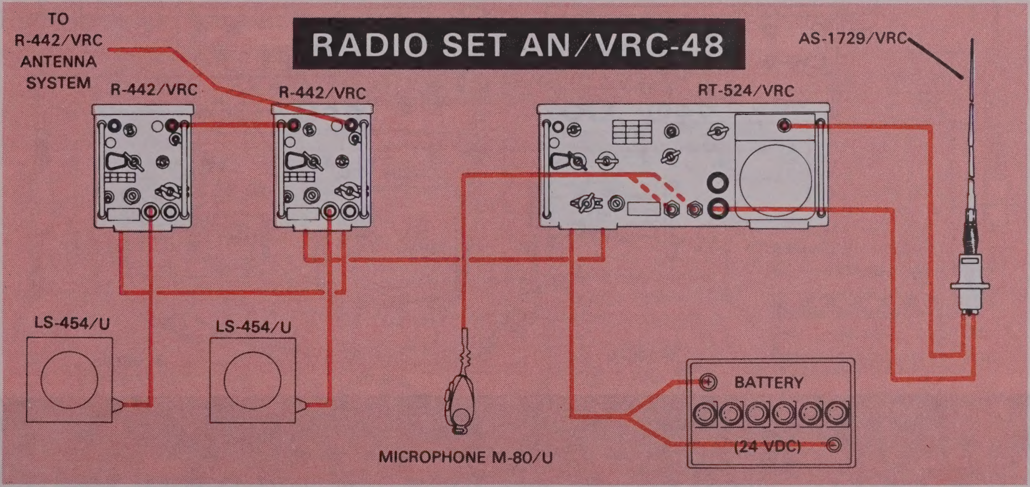
Radio Set Control C-2299/VRC (optional) provides a convenient connection point for the audio accessories.

NOTE 2.

Frequency Selector Control C-2742/VRC (optional) provides a means of remotely tuning the receiver-transmitter

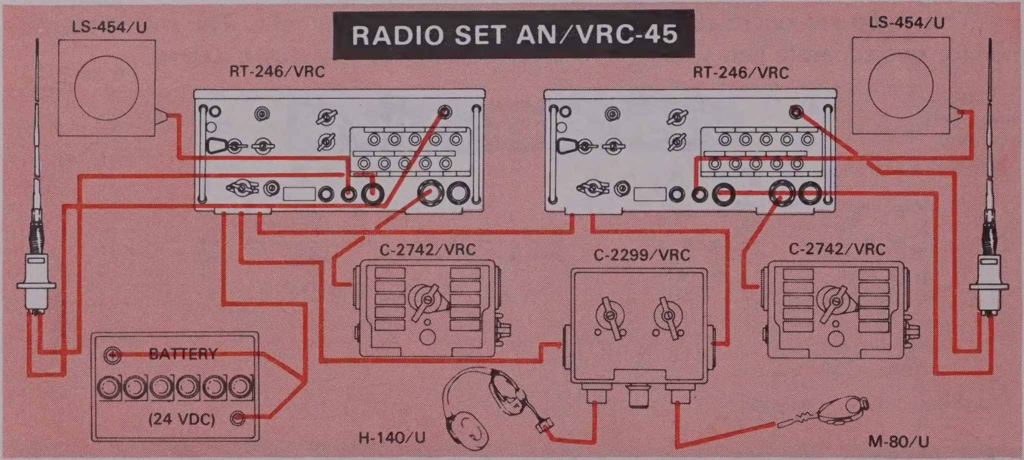
RADIO SET AN/VRC-48

This radio set operates in three radio nets at the same time. The radio receivers monitor two separate nets while the receiver-transmitter operates in a third.


TO R-442/VRC ANTENNA SYSTEM
RADIO SET AN/VRC-48
AS-1729/VRC
R-442/VRC
R-442/VRC
RT-524/VRC
LS-454/U
LS-454/U
BATTERY
(24 VDC)
MICROPHONE M-80/U

RADIO SET AN/VRC-45

This radio set provides automatic retransmission of radio signals between two stations that are too far apart to communicate with each other directly. Each receiver-transmitter establishes communications with a different station on a different frequency. Retransmission between the two stations is controlled with the C-2299/VRC.


RADIO SET AN/VRC-45
LS-454/U
RT-246/VRC
RT-246/VRC
LS-454/U
C-2742/VRC
C-2299/VRC
C-2742/VRC
BATTERY
(24 VDC)
H-140/U
M-80/U

NOTE 1.

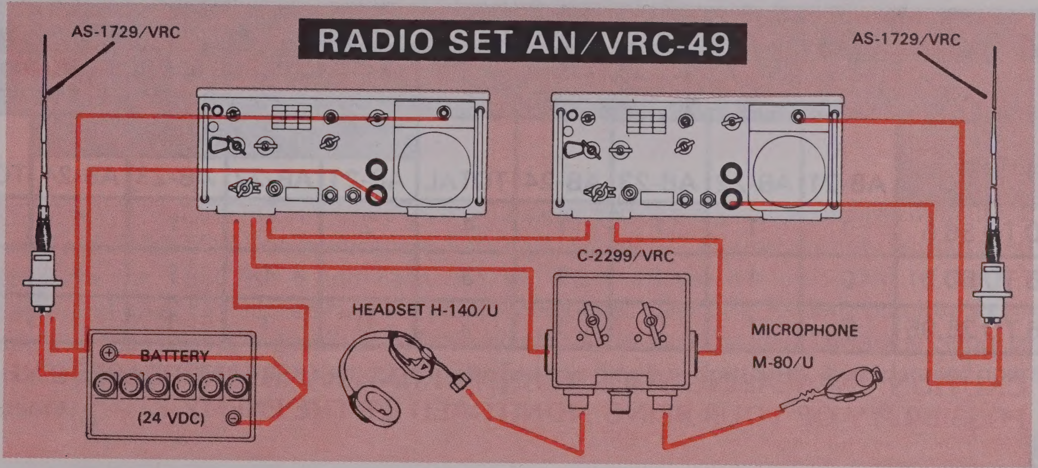
Radio Set Control C-2299/VRC is required for operating the "VRC-45" and "VRC-49" in the retransmission mode. It also provides a convenient connection point for the audio accessories.

NOTE 2

Frequency Selector Control C-2742/VRC (optional) provides a means of remotely tuning the receiver transmitter RT-246/VRC.

RADIO SET AN/VRC-49

This radio set provides automatic retransmission of radio signals between two stations that are too far apart to communicate with each other directly. Each receiver-transmitter establishes communications with a different station on a different frequency. Retransmission between the two stations is controlled with the C-2299/VRC.


RADIO SET AN/VRC-49
AS-1729/VRC
AS-1729/VRC
C-2299/VRC
HEADSET H-140/U
MICROPHONE
M-80/U
BATTERY
(24 VDC)

EQUIPMENT USED WITH AN/VRC-12 SERIES RADIOS

Frequently, certain additional items of equipment are available to increase the performance or versatility of the AN/VRC-12 series radio sets. These are separate items and are not required for normal operation of the radios. The particular piece of equipment required depends on the job which the radio set must perform. The following information briefly describes the equipment required for each application and gives a TM number for further reference.

ANTENNA RC-292. You can approximately double your transmitting range by installing an RC-292 Ground Plane Antenna. The chart below shows the antenna elements required for a given frequency range. See TM 11-5820-348-15 for installation instructions.

ANTENNA RC-292

FREQUENCY (MHz)	RADIATING ANTENNA SECTIONS REQUIRED					GROUND PLANE SECTIONS REQUIRED FOR 3 GROUND PLANE ELEMENTS				
						PER ELEMENT				
	AB-21	AB-22	AB-23	AB-24	TOTAL	AB-21	AB-22	AB-23	AB-24	TOTAL
30.0 TO 36.5	1	1	1	1	4	2	1	1	1	15
36.5 TO 50.5	0	1	1	1	3	1	1	1	1	12
50.5 TO 75.95	0	1	0	1	2	0	1	1	1	9

CAUTION: INCREASING YOUR TRANSMITTING RANGE INCREASES THE POSSIBILITY OF YOUR BEING MONITORED BY THE ENEMY.

POWER SUPPLY PP-2953/U. AN/VRC-12 series radios may be used in fixed locations such as CP's and small communications shelters. When installed in this manner, however, an AN/VRC-12 set requires an external 22- to 30-volt dc power source. Power Supply PP-2953/U can be used to provide this power. See TM 11-6130-233-12 for installation and operating instructions.

RADIO SET CONTROLS. Radio wire integration (RWI) can be provided by using either Radio Set Control AN/GSA-7, Radio Set Control AN/GRA-6 or Radio Set Control Group AN/GRA-39. In addition, the AN/GRA-39 and AN/GRA-6 can be used to control radio sets of the AN/VRC-12 series from a remote location. Remote control operation with the AN/GRA-39 is described briefly in PART II. For more detailed instructions on remote control and RWI, see the following references:

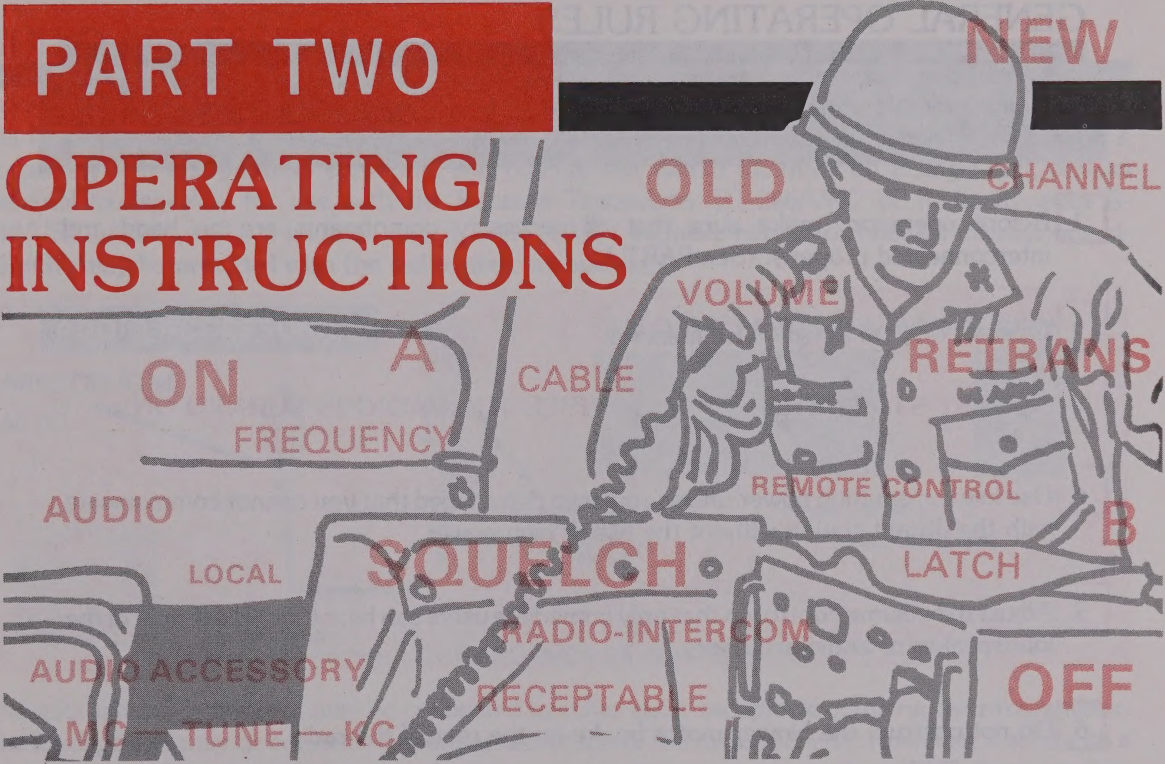
AN/GRA-39	TM 11-5820-477-12
AN/GRA-6	TM 11-5038
AN/GSA-7	TM 11-5135-15

TSEC/KY-8 AND TSEC/KY-38. AN/VRC-12 series radios can provide secure communications when used with "NESTOR Communications Security Equipment." The two security devices used with the series are the TSEC/KY-8 and TSEC/KY-38. These devices are connected to the X-Mode receptacles and must be installed by maintenance personnel. Use of the X-Mode requires an internal adjustment to the receiver-transmitter and the security device must be keyed properly before secure operation is possible. TM 11-5810-300-12 (0), which at this time is in draft form, gives detailed operating instructions.

Part I has presented you with a description of the AN/VRC-12 family of radio sets. You should now have a pretty good idea of how the components, accessories, power supplies, and security devices all tie together. The next important item is operation. **Part II** has the answers for you.

PART TWO

OPERATING INSTRUCTIONS


NEW
OLD
CHANNEL
VOLUME
RETRANS
A
ON
CABLE
FREQUENCY
REMOTE CONTROL
B
AUDIO
LOCAL
SQUELCH
LATCH
RADIO-INTERCOM
AUDIO ACCESSORY
OFF
RECEPTABLE
MC — TUNE — KC

GENERAL OPERATING RULES

To reduce maintenance problems and improve security, learn and follow these general rules for operation of the radio sets.

1. Before operation, make sure that all necessary components are on hand and interconnected properly. (See PART I.)

2. Operate only on assigned frequencies.

3. **DO NOT START THE VEHICLE WHILE THE RADIO IS TURNED ON.**

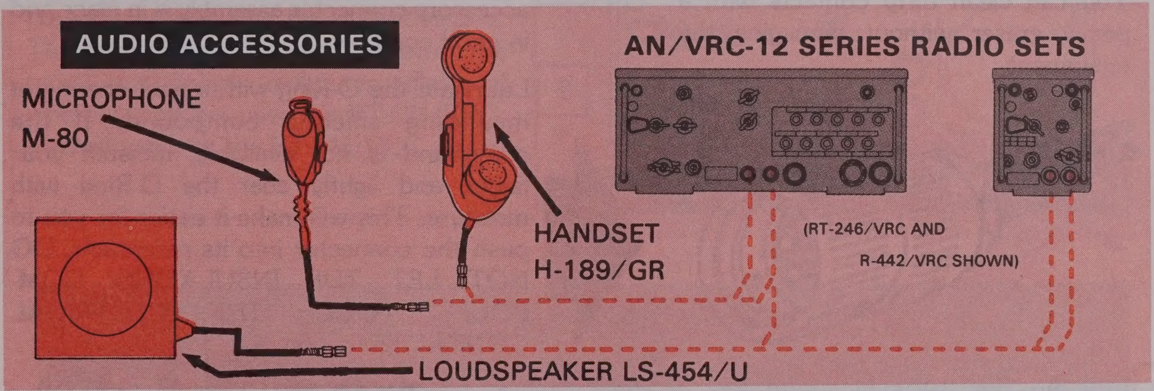
4. Use low transmitting power unless you have determined that you cannot communicate with the distant station without the use of high power.

5. Adjust the volume control so that only immediate users can hear the audio output of the loudspeaker or audio accessory.

6. Do not obstruct the blower motor intake on the rear of the radio.

AUDIO ACCESSORIES

Audio accessories refer to devices required for talking and listening. The audio accessories that you will be primarily concerned with include: a MICROPHONE with push-to-talk switch; a HANDSET consisting of a microphone, earphone, and push-to-talk switch mounted on a single unit; and an external loudspeaker for use with the Receiver-Transmitter RT-246/VRC or Radio Receiver R-442/VRC. Additionally, a combat vehicle crew (CVC) member helmet or headset microphone H-161/GR may be provided with the radio-intercom system.


AUDIO ACCESSORIES
AN/VRC-12 SERIES RADIO SETS
MICROPHONE
M-80
HANDSET
H-189/GR
(RT-246/VRC AND
R-442/VRC SHOWN)
LOUDSPEAKER LS-454/U

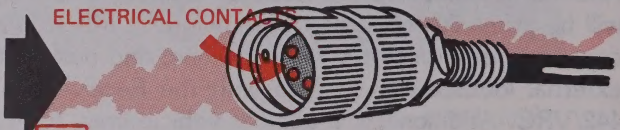
The microphone or handset may be connected to either audio receptacle of the receiver-transmitter. The loudspeaker may be connected to either receptacle of the radio receiver. However, if used with a receiver-transmitter, the speaker must be connected to the receptacle marked SPKR. See page 2-33 for connections of audio accessories to the radio-intercom system.

TO CONNECT THE AUDIO ACCESSORIES

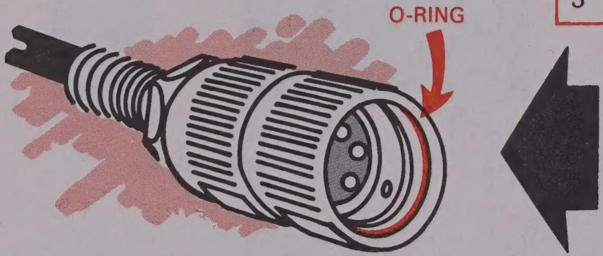
1 Insure that audio connectors and receptacles are clean and in good condition before attempting to connect the audio accessories.

Check the electrical contacts to insure that they are free of dirt, moisture, or corrosion.

You can clean dirty contacts with a pencil eraser without damaging the equipment.

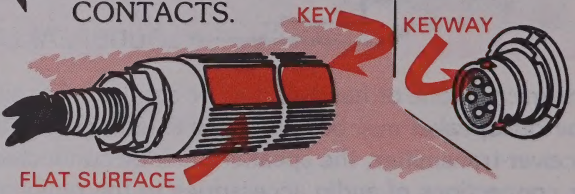


2 Make sure that the O-Ring in the audio accessory connector assembly is in place and in good condition.



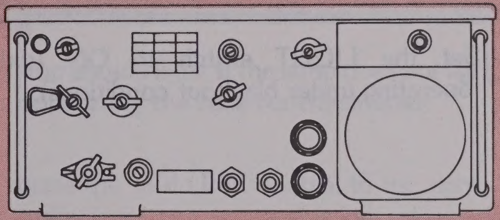
3 Lubricate the O-Ring with a light coating of insulating silicone compound. If the compound is not available, moisten your finger and lightly coat the O-Ring with moisture. This will make it easier for you to push the connector into its receptacle. DO NOT LET THE INSULATING COMPOUND TOUCH THE ELECTRICAL CONTACTS.

4 Line up the flat suface and key of the connector with the keyway of the receptacle. Push the connector into the receptacle and twist to the right until it locks into place.



THE RECEIVER-TRANSMITTER

The receiver-transmitter is the heart of any AN/VRC-12 series radio set. This is the component that provides the two-way communications with the distant station. The operating procedures outlined on the next four pages apply regardless of whether your set uses the RT-524/VRC, as illustrated, or the RT-246/VRC.



RECEIVER-TRANSMITTER RT-524/VRC

CAUTION

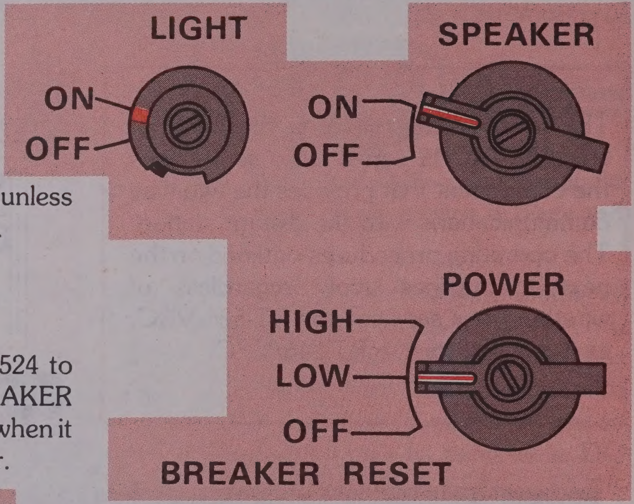
Before turning on your receiver-transmitter, make sure that all proper connections, including the audio accessories, have been made; that all switches are turned off; and that the VOLUME control is turned fully couterclockwise. Now, go to the next page and follow the guidelines listed for the proper operation of your set.

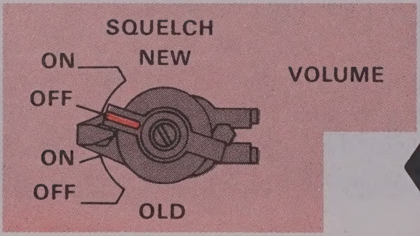
A MAKE THESE INITIAL CONTROL SETTINGS

1 Set the POWER switch to LOW.

2 Set the LIGHT switch to ON (unless operating under blackout conditions).

3 Set the SPEAKER switch on the RT-524 to ON. The RT-246 does not have a SPEAKER switch. An external loudspeaker is on when it is connected to a receiver-transmitter.


LIGHT
ON
OFF
SPEAKER
ON
OFF
POWER
HIGH
LOW
OFF
BREAKER RESET


SQUELCH
NEW
ON
OFF
ON
OFF
OLD
VOLUME

4 Set the SQUELCH switch to OFF until you have made initial contact and determined that reception in the SQUELCH mode is possible. See page 2-14, SQUELCH MODE OPERATION.

B THEN, CHECK YOUR SET FOR INDICATIONS OF NORMAL OPERATION

NOTE

MAKE ALL FOUR CHECKS BEFORE REFERRING TO THE TROUBLESHOOTING SECTION. If you cannot obtain the proper indications in any of the following checks, your set is not getting the proper power. *Check the troubleshooting tips on page 3-2.*

1 With the LIGHT switch in the ON position, the dial lamp should light. If the lamp does not light, the bulb may be burned out. This will not prevent your operating the receiver-transmitter.

2 With the SQUELCH switch in the OFF position, rotate the VOLUME control to the right. You should hear a rushing noise in the loudspeaker or audio accessory, increasing in loudness as the VOLUME control is rotated. *If you do not hear a rushing noise, check the troubleshooting tips on page 3-2.*

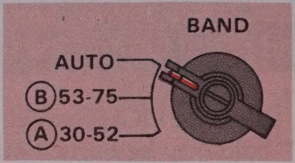
3 Press the audio accessory push-to-talk switch. The rushing noise should stop and you should hear the blower motor running while the switch is depressed. *If you do not hear the blower motor, check the troubleshooting tips on page 3-2.*

4 Release the audio accessory push-to-talk switch. The blower motor should stop running. If it does not, press and release the push-to-talk switch again. *If the blower still continues to run, check the troubleshooting tips on page 3-2.*

C NEXT, TUNE YOUR RADIO TO THE ASSIGNED FREQUENCY

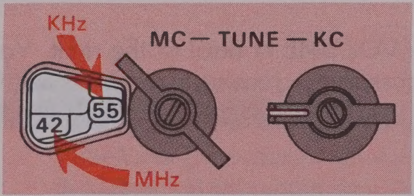
1 Select the operating frequency from the CEOI. It will be a four-digit number indicating the radio frequency in MEGAHERTZ (MHz or MC). The last two digits, indicating the fractional value of MHz, may also be referred to as KILOHERTZ (kHz or KC). Thus a frequency of 42.55 indicates 42.55 MHz or 42 MHz plus 55 kHz.

2 Set the BAND switch to the position that includes the first two digits (MHz) of the operating frequency. For automatic tuning of the RT-246/VRC using the pushbutton, set the BAND switch to AUTO.

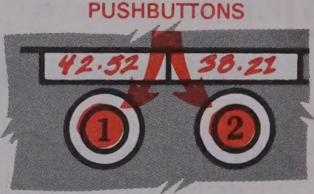


3 Turn the MC control until the first two digits (MHz) of the operating frequency appear in the left section of the dial window.

4 Turn the KC control until the last two digits (kHz) of the operating frequency appear in the right section of the dial window.



5 For automatic tuning of the RT-246/VRC to a preset frequency, depress the pushbutton labeled with the assigned frequency. After each frequency change, wait until the new frequency appears in the dial window before using the radio for communications. If the pushbuttons have not been preset, tune the set manually or set up the assigned frequencies yourself by following the procedures on page 2-21.



D NOW YOU ARE READY TO USE THE RADIO SET FOR COMMUNICATIONS

1 Press the push-to-talk switch on the audio accessory and talk into the microphone.

You should hear your own voice (sidetone) in the loudspeaker or earphone of the audio accessory. *(If you do not, check the troubleshooting tips on page 3-2.)*

NOTE

WHEN YOU ARE USING AN AUDIO ACCESSORY, DO NOT OVERSTRETCH THE CORD. This action results in an intermittent breaking of the electrical connection between the connector and its receptacle and causes an interruption of communications.

2 Release the push-to-talk switch to hear the reply. *(If you are unable to hear a reply or if the reply is weak, refer to the troubleshooting tips on page 3-2.)*

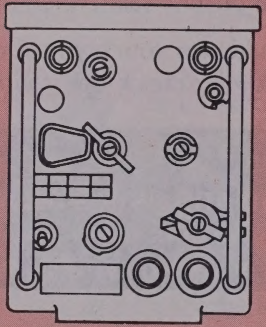
3 Adjust the VOLUME control for a comfortable listening level.

E FINALLY, TURN THE RADIO OFF WHEN NOT IN USE

Set the POWER switch to OFF.

RADIO RECEIVER R-442/VRC

The radio receiver R-422/VRC is a basic component of some AN/VRC-12 series radio sets. It operates receive-only and provides the capability to monitor one radio net while operating the receiver-transmitter in another net.



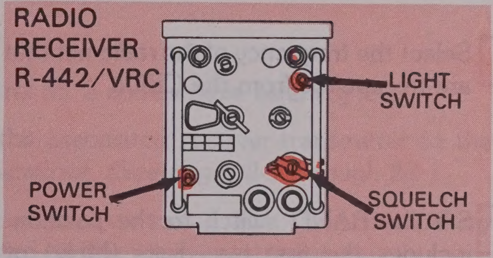
RADIO RECEIVER R-442/VRC

CAUTION

Before turning your receiver on, make sure that all proper connections, including the audio accessories, have been made; that all switches are turned off; and that the VOLUME control is turned fully counterclockwise. Now, turn the page and follow the guidelines listed for the proper operation of your set.

A MAKE THESE INITIAL CONTROL SETTINGS

1. Set the POWER switch to ON-RESET.
2. Set the LIGHT switch to ON (unless operating under blackout conditions).
3. Set the SQUELCH switch to OFF until you have determined that reception in the SQUELCH mode is possible. *See page 2-14 SQUELCH MODE OPERATION.*



B THEN CHECK THE RECEIVER FOR INDICATIONS OF NORMAL OPERATION

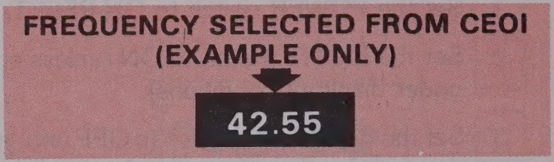
NOTE

Make both of the following checks before referring to the troubleshooting section. If you are unable to obtain the proper indication in both checks, you may have a power problem. *Check the troubleshooting tips on page 3-2.*

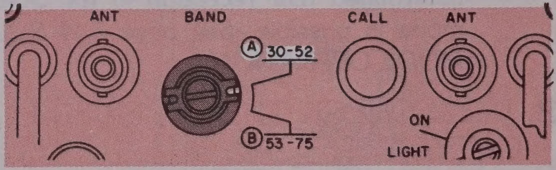
With the LIGHT switch set to ON, the dial lamp should light. If it does not, it may indicate only a burned out bulb. This will not prevent your operating the radio receiver. With the SQUELCH switch set to either NEW OFF or OLD OFF, rotate the VOLUME control to the right. You should hear a rushing noise in the loudspeaker increasing in loudness as the VOLUME control is rotated. *If you do not, check the troubleshooting tips on page 3-2.*

C NEXT, TUNE THE RECEIVER TO THE ASSIGNED FREQUENCY

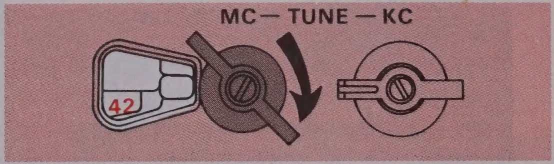
1 Select the frequency of the radio net that you are to monitor from the CEOI.


FREQUENCY SELECTED FROM CEOI
(EXAMPLE ONLY)
42.55

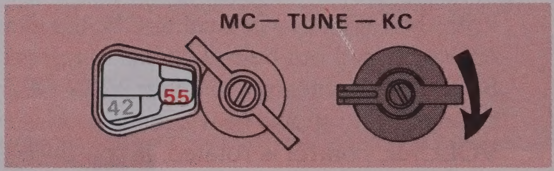
2 Set the BAND switch to the position that includes the first two digits (MHz) of the assigned frequency.


ANT
BAND
CALL
ANT
Ⓐ 30-52
Ⓑ 53-75
ON
LIGHT

3 Turn the MC control until the first two digits (MHz) of the assigned frequency appear in the left section of the dial window.


MC — TUNE — KC
42

4 Turn the KC control until the last two digits (kHz) of the assigned frequency appear in the right section of the dial window.


MC — TUNE — KC
42
55

D NOW YOU ARE READY TO MONITOR THE ASSIGNED RADIO NET

1 Initially, set the VOLUME control to midrange.

2 During reception of signals, adjust the VOLUME control for a comfortable listening level.

3 To communicate with the distant transmitter, tune the associated receiver-transmitter to the frequency of the radio receiver and establish communications. *(See pages 2-3 through 2-9.)*

4 Now, insure that communications continuity is maintained in all operating nets. Tune the auxiliary receiver to the frequency that had previously been tuned on the receiver-transmitter.

* * *

FOR EXAMPLE: Suppose that you have been operating the receiver-transmitter in the battalion command net and monitoring the operations-intelligence net with an auxiliary receiver. You are required to communicate in the operations-intelligence net, so you retune the receiver-transmitter to the frequency assigned this net. Now, to maintain radio contact with the battalion command net, retune the auxiliary receiver to the battalion command net frequency.

* * *

E FINALLY, TURN THE RECEIVER OFF WHEN NOT IN USE

Set the POWER switch to OFF.

SQUELCH MODE OPERATION

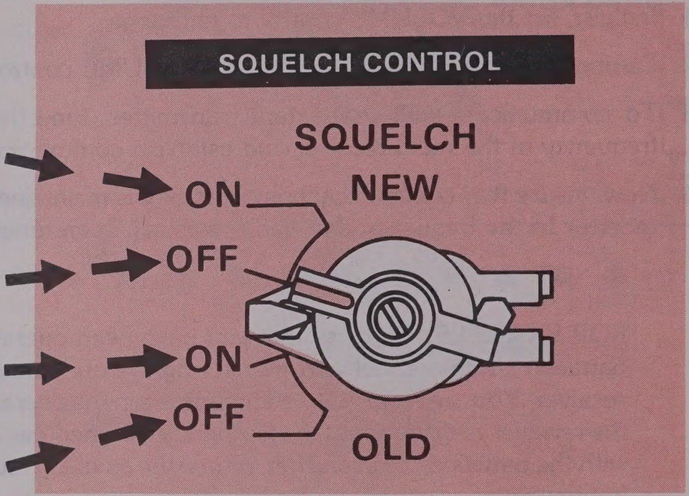
FUNCTIONS OF SQUELCH CONTROL

An incoming carrier with 150 Hz TONE is required by receiver section to deactivate squelch circuitry. Transmitter 150 Hz oscillator operates when RT unit is keyed.

No squelch operation in receiver section. Transmitter 150 Hz oscillator operates when RT unit is keyed.

An incoming carrier is required by receiver section to deactivate squelch circuitry. Transmitter 150 Hz DOES NOT OPERATE when RT unit is keyed.

No squelch operation in receiver section. Transmitter 150 Hz oscillator operates when RT unit is keyed.



The radio sets in the AN/VRC-12 series produce a continuous rushing noise in the loudspeaker or earphone of the audio accessory. If this noise becomes particularly annoying, or if it constitutes a security problem, you can eliminate it by operating in the SQUELCH mode. Turn the page and follow the guidelines listed for the proper operation of the SQUELCH mode.

A **DETERMINE THE APPROPRIATE SQUELCH MODE.** AN/VRC-12 series radio sets may be operated in either of two distinct squelch modes. Normally, you will be directed by SOP or the C-E Annex to the Operation Order as to which mode to use. The SQUELCH switch on your set will be confined to this mode by the SQUELCH SWITCH LATCH. If, for any reason, you are not sure of the proper squelch mode or you are required to change the squelch mode:

1 Use the chart below to determine the correct SQUELCH switch ON setting. The OFF settings are identical and it makes no difference which mode you are in if your SQUELCH switch is set to OFF.

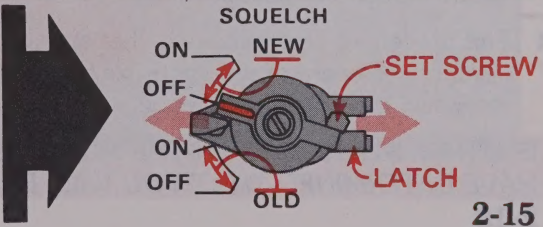
SQUELCH MODE OPERATION

IF THE DISTANT TRANSMITTER:	IS AN AN/VRC-12 SERIES RADIO SET WITH ITS SQUELCH SWITCH SET TO:		IS NOT AN AN/VRC-12 SERIES RADIO SET BUT:	
	NEW ON NEW OFF OLD OFF	OLD ON OLD OFF NEW OFF	TRANSMITS A 150 Hz SQUELCH TONE	DOES NOT TRANSMIT A 150 Hz SQUELCH TONE
AND YOU ARE CONDUCTING TWO-WAY COMMUNICATION, THEN SET YOUR SQUELCH SWITCH TO:	NEW ON	OLD ON	NEW ON	OLD ON
OPERATING RECEIVE ONLY, THEN SET YOUR SQUELCH SWITCH TO:	NEW ON OLD ON	OLD ON	NEW ON OLD ON	OLD ON

2 Loosen the SQUELCH switch latch set screw and slide the latch to the left.

3 Set the SQUELCH switch to the correct squelch mode.

4 Slide the SQUELCH switch latch to the right and tighten the set screw.

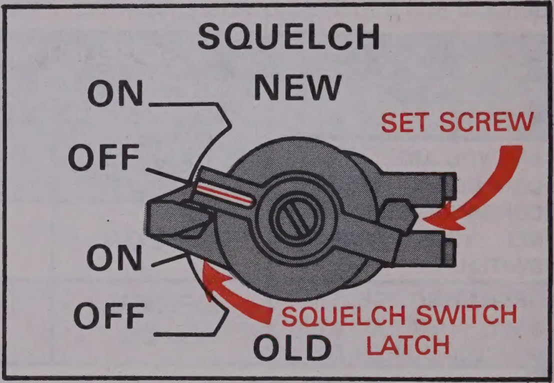


B DETERMINE IF YOU WILL BE ABLE TO RECEIVE IN THE SQUELCH MODE. For any number of reasons you may not be able to receive the distant station while operating in the SQUELCH mode. Therefore, before placing your set in the SQUELCH mode and periodically during SQUELCH operation, perform the following checks to determine if you can receive in the SQUELCH mode:

1 Establish satisfactory communications with the SQUELCH switch set to OFF.

2 Set the SQUELCH switch on your receiver-transmitter or radio receiver to ON (NEW or OLD as appropriate). At this time the rushing noise should stop.

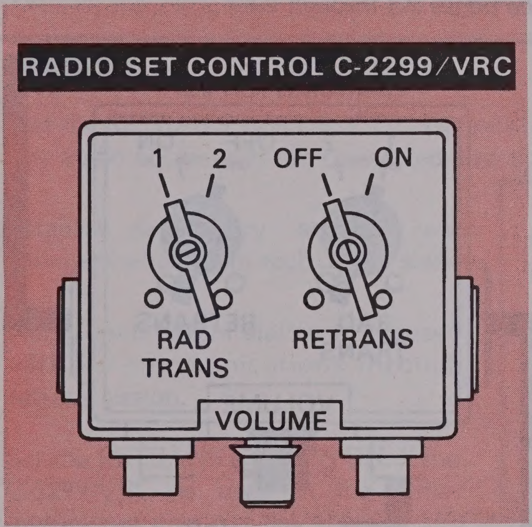
3 Have the distant radio station send a short test message. The call lamp should light and you should hear the message. If you cannot hear the test message, then you will not be able to operate in the SQUELCH mode. Set the SQUELCH switch to OFF and advise the distant station of the situation.



4 This procedure determines whether or not you will be able to receive in the SQUELCH mode. The distant radio operator is responsible for determining whether or not the distant station will be able to receive in the SQUELCH mode.

IF EITHER STATION IS ON THE MOVE, LEAVE THE SQUELCH SWITCH OFF *UNTIL YOU HAVE DETERMINED THAT YOU WILL BE ABLE TO RECEIVE IN THE SQUELCH MODE.*

RADIO SET CONTROL C-2299/VRC


RADIO SET CONTROL C-2299/VRC
1
2
OFF
ON
RAD TRANS
RETRANS
VOLUME

The C-2299/VRC is an optional item of equipment for radio sets AN/VRC-12 through AN/VRC-44. Usually, it is mounted on the vehicle's dashboard to provide the operator with a convenient connection point for the radio accessories. It is required for radio sets AN/VRC-45 and AN/VRC-49. In these two configurations, it is used to control retransmission.

Before operating the C-2299, make sure that all the proper connections, including the audio accessories, have been made. See the cabling diagram in PART I that applies to your set.

REMOTE CONTROL OPERATION

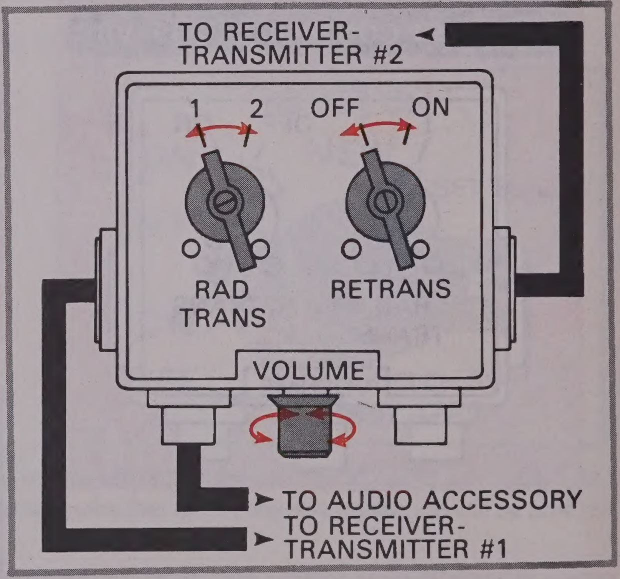
1 Turn on and tune the receiver-transmitter. (*See pages 2-3 through 2-8.*)

2 Set the RETRANS switch to OFF.

3 Set the RAD TRANS switch to:

a. Position 1 to control a receiver-transmitter connected to the left side of the C-2299/VRC.

b. Position 2 to control a receiver-transmitter connected to the right side of the C-2299/VRC.


TO RECEIVER-TRANSMITTER #2
1
2
OFF
ON
RAD TRANS
RETRANS
VOLUME
TO AUDIO ACCESSORY
TO RECEIVER-TRANSMITTER #1

4 Press the push-to-talk switch on the audio accessory and speak into the microphone.

5 Release the push-to-talk switch to hear the reply.

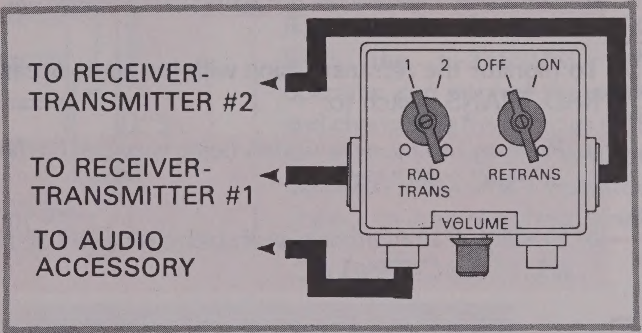
6 Adjust the VOLUME control for the desired volume in the audio accessory.

AUTOMATIC RETRANSMISSION

1 Turn on and tune each receiver-transmitter to the assigned frequency.

THE FREQUENCIES SELECTED FOR RETRANSMISSION MUST BE AT LEAST 10 MHz APART.

2 Set the RETRANS switch to OFF. The position of the RAD TRANS switch does not matter unless the audio accessories are connected directly to the C-2299/VRC. *(See page 2-18.)*


TO RECEIVER-TRANSMITTER #2
TO RECEIVER-TRANSMITTER #1
TO AUDIO ACCESSORY
1
2
OFF
ON
RAD TRANS
RETRANS
VOLUME

3 Establish satisfactory squelch mode communications with each distant station.

4 Notify each distant station to proceed with its communications through retransmission.

5 Set the RETRANS switch to ON. If the C-2299/VRC is used in the radio-intercom system, set the AM-1780/VRC INSTALLATION SWITCH to RETRANS.

6 Set the RETRANS switch to OFF when retransmission is completed or to establish contact with either distant station. If the C-2299/VRC is used in the radio-intercom system, set the AM-1780/VRC INSTALLATION SWITCH to OTHER.

TIPS ON RETRANSMISSION OPERATION

1 After you have set up your radio for retransmission, communications between the two distant stations proceed automatically on a push-to-talk basis.

2 During retransmission, you should observe the following:

a. The CALL indicator of the receiving radio will light.

b. The blower motor on the transmitting radio will run.

3 To monitor the retransmission with the audio accessories connected to the C-2299/VRC, set the RAD TRANS switch to:

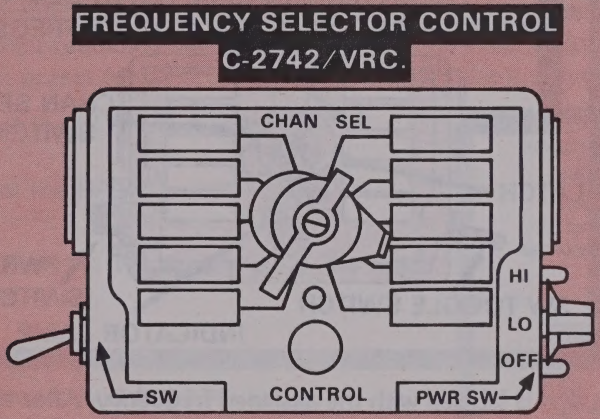
a. Position 1 to monitor signals being received by the receiver-transmitter connected to the left side of the C-2299/VRC.

b. Position 2 to monitor signals being received by the receiver-transmitter connected to the right side of the C-2299/VRC.

4 To monitor the retransmission through the radio-intercom system, set the Control Box C-2297/VRC MONITOR switches to ALL.

5 The setting of the C-2299/VRC VOLUME control has no effect on the signal between the two distant stations.

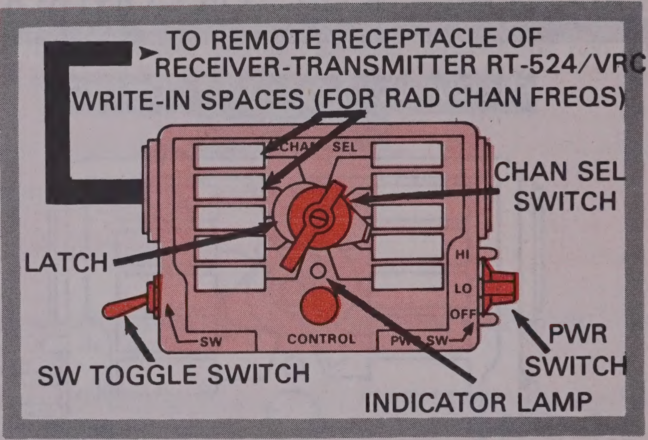
FREQUENCY SELECTOR CONTROL C-2742/VRC


FREQUENCY SELECTOR CONTROL
C-2742/VRC.
CHAN SEL
HI
LO
OFF
SW
CONTROL
PWR SW

The C-2742/VRC is an optional item of equipment for radio sets AN/VRC-12 and AN/VRC-43 through AN/VRC-45. It is normally mounted on the vehicle's dashboard, above the Radio Set Control C-2299/VRC. With the C-2742/VRC, the operator can control the power and change the frequencies of the receiver-transmitter without moving from the operator's position in the front of the vehicle.

Before operating the C-2742/VRC, make sure that proper connections have been made between the C-2742/VRC and the receiver-transmitter. See the cabling diagram in PART I that applies to your set.

TO REMOTELY CONTROL THE RT-246/VRC


TO REMOTE RECEPTACLE OF RECEIVER-TRANSMITTER RT-524/VRC
WRITE-IN SPACES (FOR RAD CHAN FREQS)
CHAN SEL
CHAN SEL SWITCH
LATCH
HI
LO
OFF
SW
CONTROL
PWR SW
PWR SWITCH
SW TOGGLE SWITCH
INDICATOR LAMP

1. Set the POWER switch on the RT-246/VRC to REMOTE.
2. Set the BAND switch on the RT-246/VRC to AUTO.
3. Momentarily push the SW toggle switch. If there are two C-2742/VRC's, push the SW switch on the one that you want to control the radio with. The CONTROL indicator should light, indicating that this C-2742/VRC has control of the receiver-transmitter.
4. Set the PWR switch to LO for low transmitting power or HI for high transmitting power.
5. Set the CHAN SEL switch to the position that is labeled with the assigned frequency. After each frequency change, wait until you hear the mechanism in the RT-246/VRC stop operating before using the radio for transmission.

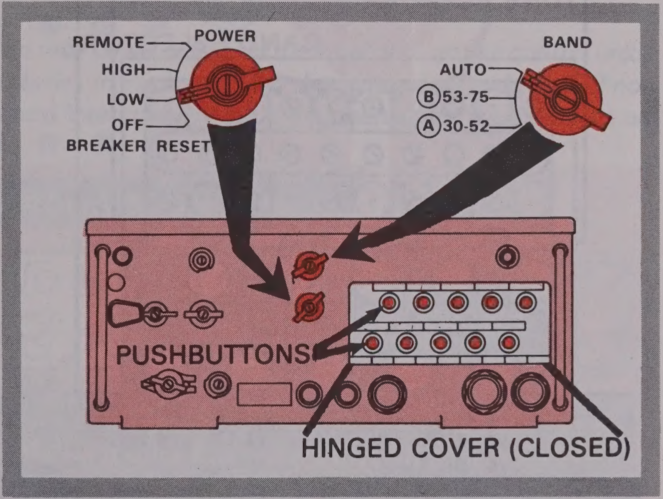
NOTE

Counterclockwise, position 1 of the CHAN SEL switch corresponds to pushbutton 1 of the RT-246/VRC; position 2 to pushbutton 2; etc. The pushbuttons on the RT-246/VRC must be preset to the assigned frequencies before you can control the radio with the C-2742/VRC. *If they are not, set them up by following the procedures on the next two pages.*

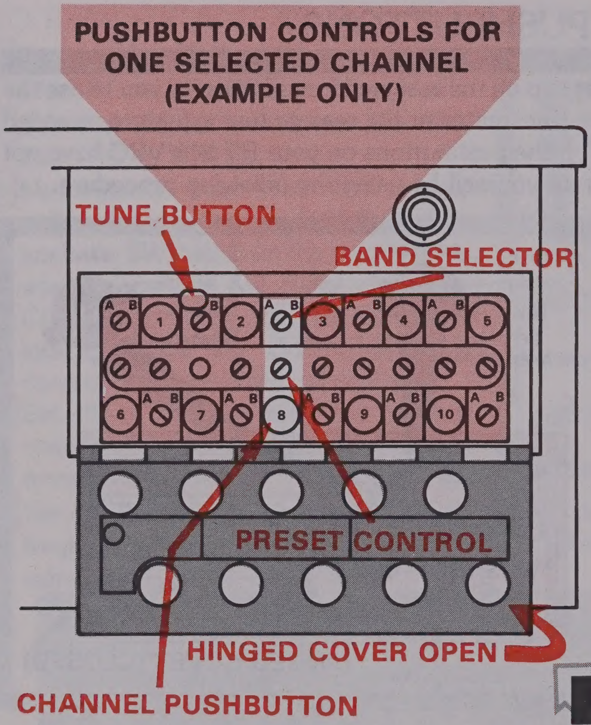
PRESETTING THE RT-246/VRC PUSHBUTTONS

The RT-246/VRC channel pushbuttons must be set up on the assigned frequencies for you to use the automatic tuning feature provided by the receiver-transmitter or the remote tuning feature provided by the Frequency Selector Control C-2742/VRC. If the pushbuttons on your RT-246/VRC have not been preset to the proper frequencies, set them up yourself by using the following procedure.

1. Set the POWER switch to LOW.
2. Set the BAND switch to AUTO.
3. Open the hinged cover of the pushbuttons.
4. Depress the pushbutton on which the frequency is to be set up.
5. Set the band selector to the position that includes the assigned frequency. Position A includes frequencies from 30 to 52 MHz. Position B includes frequencies from 53 to 75 MHz.



6. Push in and hold the tune button and turn the preset control until the assigned frequency appears in the dial window. The MC and KC controls will turn while you are turning the preset control.


PUSHBUTTON CONTROLS FOR
ONE SELECTED CHANNEL
(EXAMPLE ONLY)
TUNE BUTTON
BAND SELECTOR
A B
1
2
3
4
5
6
7
8
9
10
PRESET CONTROL
HINGED COVER OPEN
CHANNEL PUSHBUTTON

7 Check the setting of the automatic mechanism.

a. Depress another pushbutton and wait for the new frequency to appear in the dial window.

b. Depress the pushbutton on which you have set up the assigned frequency. The assigned frequency should reappear in the dial window.

8 Repeat steps 4 through 7 for each frequency that is to be set up for automatic tuning.

9 Close the hinged cover over the pushbutton adjustment controls.

10 Label each pushbutton with the frequency that you have set up on it.

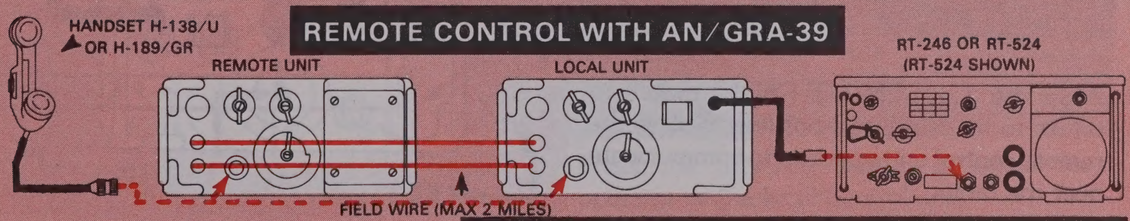
REMOTE CONROL WITH THE AN/GRA-39

Radio Set Control Group AN/GRA-39 permits an operator to communicate over the receiver-transmitter from a distance of up to 2 miles from the radio set. The two major components of the AN/GRA-39 are a local control unit C-2329/GRA-39 and a remote control unit C-2328/GRA-39. The AN/GRA-39 is not a component of the AN/VRC-12 series; however, it is often used with the series when remote operation is required.

● ● ● ●

Before operating the AN/GRA-39, remove the rear cover of BOTH the local and remote control units and make sure that there are six BA-30 batteries in each and that the batteries are clean and not corroded. Then, position the control units and interconnect the components and the radio set as shown below:

● ● ● ●


REMOTE CONTROL WITH AN/GRA-39
HANDSET H-138/U OR H-189/GR
REMOTE UNIT
LOCAL UNIT
RT-246 OR RT-524 (RT-524 SHOWN)
FIELD WIRE (MAX 2 MILES)

CAUTION

DO NOT PRESS THE RINGER BUTTON WHILE CONNECTING THE FIELD WIRE TO THE LINE BINDING POSTS.

NOTE

If the field wire has been stripped so as to leave a protective piece of insulation on the end of the wire, insure that the metal portion of the field wire makes contact with the LINE binding post.

TO OPERATE THE LOCAL CONTROL UNIT

1 Set the POWER switch to ON.

2 Initially, set the BUZZER VOLUME to midrange, then adjust for desired volume during operation.

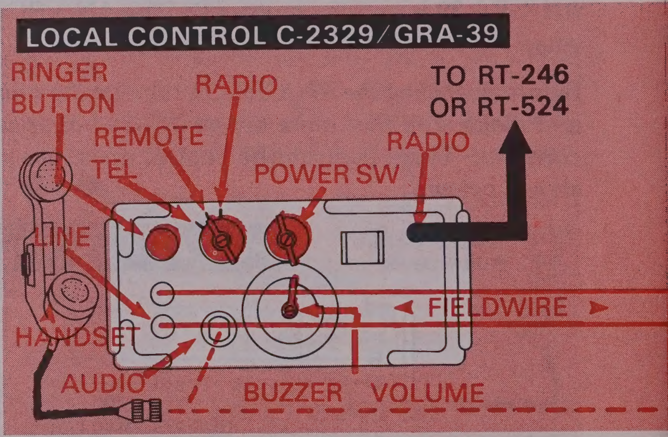
3 Hold the spring-loaded TEL-REMOTE-RADIO switch in the:

a. TEL position to communicate with the operator of the remote control unit.

b. RADIO position to communicate over the radio.

OR

Allow the TEL-REMOTE-RADIO switch to return to the REMOTE position to allow the remote control unit operator to communicate over the radio.


LOCAL CONTROL C-2329/GRA-39
RINGER BUTTON
RADIO
TO RT-246 OR RT-524
REMOTE
TEL
RADIO
POWER SW
LINE
◄ FIELDWIRE ►
HANDSET
AUDIO
BUZZER VOLUME

4 Press the RINGER button to signal the operator of the remote control unit.

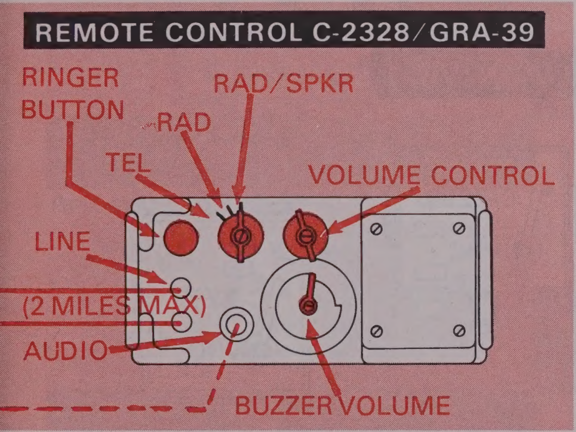
5 Press the push-to-talk switch on the audio accessory and speak into the microphone.

6 Release the push-to-talk switch to hear the reply.

TO OPERATE THE REMOTE CONTROL UNIT

1 Set the POWER switch to ON.

2 Initially, set the BUZZER VOLUME to midrange, then adjust for desired volume during operation.


REMOTE CONTROL C-2328/GRA-39
RINGER BUTTON
RAD/SPKR
RAD
TEL
VOLUME CONTROL
LINE
(2 MILES MAX)
AUDIO
BUZZER VOLUME

3 Set the TEL-RAD-RAD/SPKR switch to:

a. TEL to communicate with the operator of the local control unit.

b. RAD to communicate over the radio with the loudspeaker on the remote control unit OFF.

c. RAD/SPKR to communicate over the radio with the loudspeaker ON.

4 Press the RINGER button to signal the operator of the local control unit.

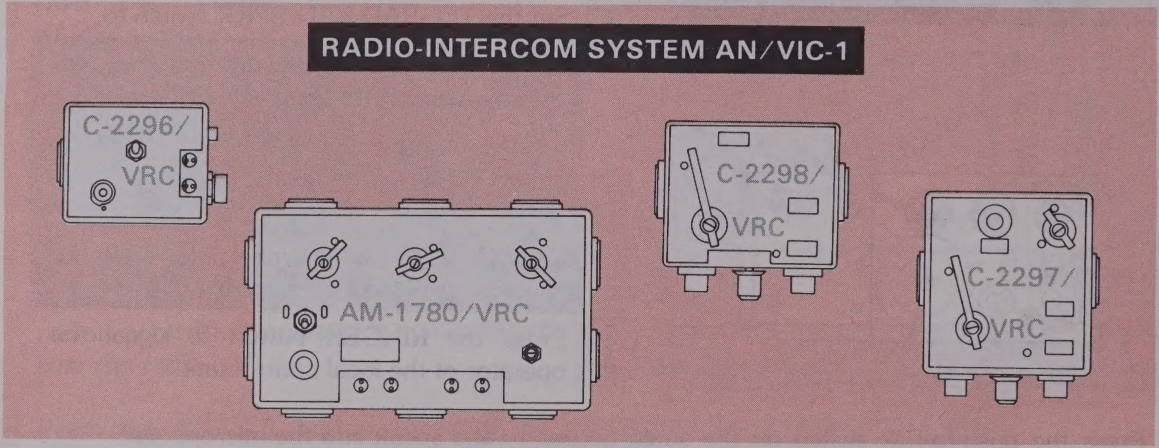
5 Press the push-to-talk switch on the audio accessory and speak into the microphone.

6 Release the push-to-talk switch to hear the reply.

7 Adjust the VOLUME control for a comfortable listening level.

RADIO-INTERCOM SYSTEM AN/VIC-1

Intercommunications Set AN/VIC-1 is provided in combat vehicles such as tanks, armored personnel carriers, weapons carriers, armored command posts, etc. It enables the crew commander and members to communicate with each other and, using the associated AN/VRC-12 series radio set, in an external radio net.

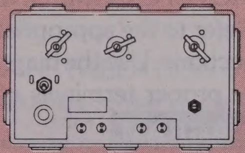

RADIO-INTERCOM SYSTEM AN/VIC-1
C-2296/VRC
AM-1780/VRC
C-2298/VRC
C-2297/VRC

The radio-intercom system, as the AN/VIC-1 is commonly called, may be provided in vehicles in which there is no radio equipment; however, the following information covers only its use in conjunction with an AN/VRC-12 series radio.

COMPONENTS OF THE RADIO-INTERCOM SYSTEM

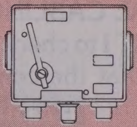
Intercommunications Set AN/VIC-1 is a vehicular configuration that, depending on the vehicle in which it is installed, includes:

COMPONENTS OF AN/VIC-1



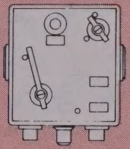
ONE Audio Frequency Amplifier AM-1780/VRC

AND



TWO to FOUR Intercommunications Set Controls C-2298/VRC

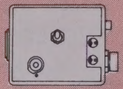
And may also include:



ONE Intercommunications Set Control C-2297/VRC

AND

POSSIBLY

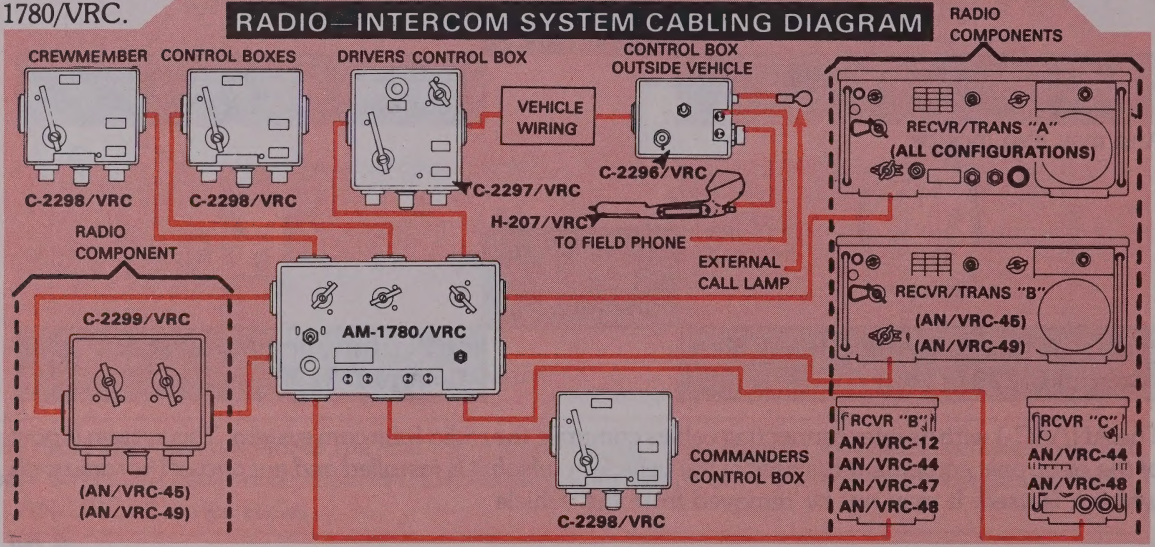


ONE Intercommunications Set Control C-2296/VRC

The AN/VIC-1 with its interconnecting cables comprise the radio-intercom system. *This system is part of the electronic equipment harness of the vehicle in which it is installed and not part of the radio with which it is used.* It may not be removed from the vehicle.

CABLING OF THE RADIO-INTERCOM SYSTEM

The diagram below illustrates cabling of the radio-intercom and associated AN/VRC-12 series components. THIS DIAGRAM SHOWS HOW THE VARIOUS RADIO COMPONENTS ARE CONNECTED TO THE INTERCOM. IT DOES NOT DEPICT THE ACTUAL COMPONENTS OR THE INTERNAL CABLING OF ANY PARTICULAR RADIO SET. Refer to the appropriate cabling diagram in PART I to check your set for completeness and proper connections. Use the diagram below to make sure that the components of your set are connected to the proper terminals of the AM-1780/VRC.


RADIO—INTERCOM SYSTEM CABLING DIAGRAM
CREWMEMBER CONTROL BOXES
C-2298/VRC
C-2298/VRC
DRIVERS CONTROL BOX
VEHICLE WIRING
CONTROL BOX OUTSIDE VEHICLE
C-2296/VRC
C-2297/VRC
H-207/VRC
TO FIELD PHONE
EXTERNAL CALL LAMP
RADIO COMPONENTS
RECVR/TRANS "A"
(ALL CONFIGURATIONS)
RECVR/TRANS "B"
(AN/VRC-45)
(AN/VRC-49)
RADIO COMPONENT
C-2299/VRC
(AN/VRC-45)
(AN/VRC-49)
AM-1780/VRC
COMMANDERS CONTROL BOX
C-2298/VRC
RCVR "B"
AN/VRC-12
AN/VRC-44
AN/VRC-47
AN/VRC-48
RCVR "C"
AN/VRC-44
AN/VRC-48

THE AUDIO FREQUENCY AMPLIFIER AM-1780/VRC

The AM-1780/VRC amplifies the intercom and radio receiver output and is the main junction box of the radio-intercom system. Adjust the controls on the front of the amplifier according to the following procedure. Except for the MAIN PWR switch, don't change the controls after the initial settings have been made.

1 Set the INSTALLATION SWITCH to OTHER. This setting is used unless two receiver-transmitters are operating in the retransmission mode. *(See pages 2-17 through 2-20.)*

2 If the C-2299/VRC is connected to the AM-1780/VRC, set the RETRANS switch of the C-2299/VRC to OFF. Do not change the position of this switch unless you are establishing automatic retransmission. *(See pages 2-17 and 2-18.)*

3 Set the RADIO TRANS switch to:

a. CDR + CREW if all crew members are to operate the receiver-transmitter.
b. CDR ONLY if only the crew commander is to operate the receiver-transmitter.
c. LISTENING SILENCE if no crew member is to operate the receiver-transmitter.

4 Set the INT ACCENT switch to:

a. ON to make the intercom audio louder than the received radio signals.
b. OFF to make the intercom audio the same volume as the received radio signals.

5 Set the MAIN PWR switch to:

a. NORM to operate the radio-intercom and its associated AN/VRC-12 series radio.
b. INT ONLY to operate the radio-intercom only.

6 Turn on and tune the associated AN/VRC-12 series radio set.

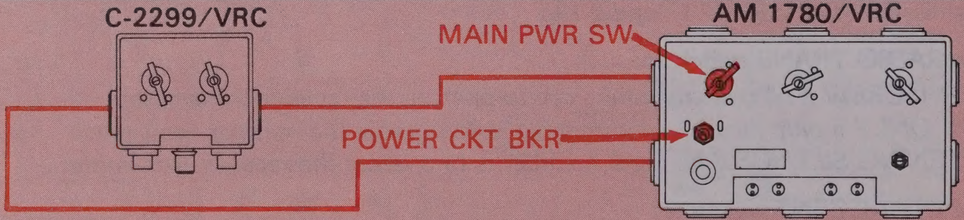
7 Set the POWER CKT BKR switch to ON. The POWER indicator lamp should light.

8 Control operation of the radio-intercom and the AN/VRC-12 series radio with the crew member control boxes. (*See pages 2-35 through 2-39.)*

9 Use the proper shutdown procedure when the radio-intercom or the radio set is not in use.

a. Set the MAIN PWR switch to OFF to turn off both the radio-intercom system and its associated radio set.

b. Set the POWER CKT BKR switch to OFF to turn off only the radio-intercom system.



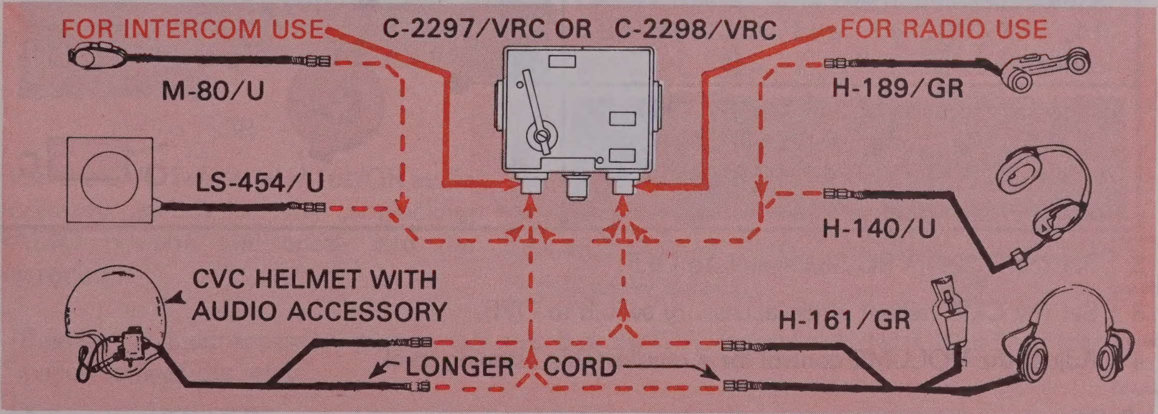
NOTE

Receiver radio signals are not available at the C-2299/VRC when it is connected to the AM-1780/VRC. You may connect audio accessories to the C-2299/VRC to control radio transmission *(see page 2-17)*; however, you must receive direct from the radio set or on audio accessories connected to the radio-intercom control boxes.

COMMUNICATING FROM INSIDE THE VEHICLE USING CREW MEMBER CONTROL BOXES C-2297/VRC AND C-2298/VRC

The Drivers Control Box C-2297/VRC and the Crew Member Control Boxes C-2298/VRC are mounted on the inside of the vehicle. They provide the crew members with the means to control operation of the radio-intercom and its associated radio set. Additionally, the C-2297/VRC connects the C-2296/VRC into the radio-intercom system. Except for control of the C-2296/VRC by the C-2297/VRC, the operating instructions are the same for both control boxes. Turn on the AM-1780/VRC and turn on and tune the radio set. Then follow the operating instructions below and on the next four pages.

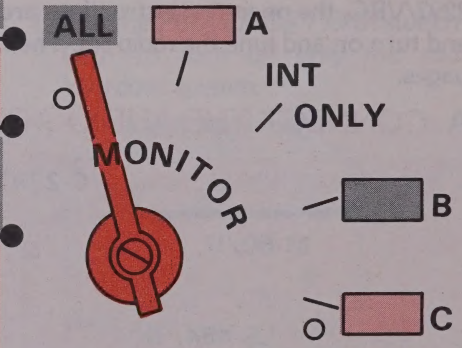
A CONNECT THE AUDIO ACCESSORIES AS SHOWN BELOW


FOR INTERCOM USE
C-2297/VRC OR C-2298/VRC
FOR RADIO USE
M-80/U
H-189/GR
LS-454/U
H-140/U
CVC HELMET WITH
AUDIO ACCESSORY
H-161/GR
LONGER CORD

B TO MONITOR THE RADIO AND/OR RADIO-INTERCOM

1 Set he MONITOR switch to the appropriate position as indicated below:

TO MONITOR	SET THE MONITOR SWITCH TO:
All signals from both the radio set and the radio-intercom system	ALL
Receiver-transmitter A in all configurations	A
Radio receiver B in AN/VRC-12, AN/VRC-44, AN/VRC-47 and AN/VRC-48 configurations	B
Receiver-transmitter B in AN/VRC-45 and AN/VRC-49 configurations OR radio receiver C in AN/VRC-44 and AN/VRC-48 configurations	C



2 Set the C-2297/VRC SIG switch to OFF.

3 Set the CVC helmet audio accessory switch to OFF.

4 Adjust the VOLUME control for a comfortable listening level.

C TO COMMUNICATE OVER THE RADIO

1 Set the MONITOR switch to:

a. All, A, or B to transmit over receiver-transmitter A in any configuration.

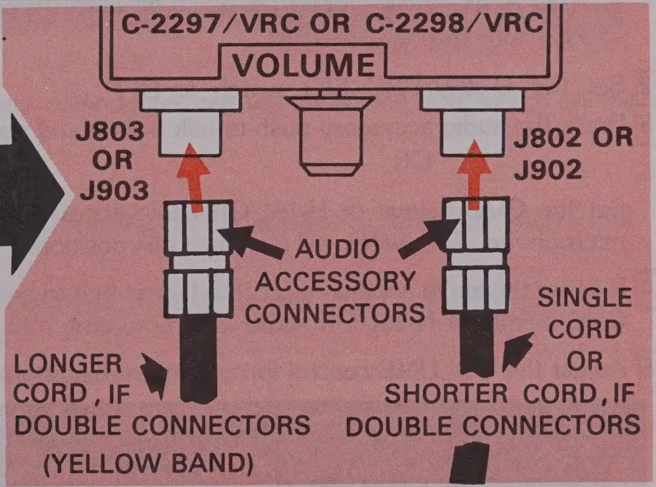
b. C to transmit over receiver-transmitter B in an AN/VRC-45 or AN/VRC-49 configuration.

2 Set the C-2297/VRC SIG switch to OFF.

3 Press the audio accessory push-to-talk switch and speak into the microphone. THE AUDIO ACCESSORY MUST BE CONNECTED TO RECEPTACLE J802 ON THE C-2298 or J902 ON THE C-2297/VRC.

OR

Hold the CVC helmet or H-161/GR audio accessory switch in the nonlocking RADIO position and speak into the microphone.


C-2297/VRC OR C-2298/VRC
VOLUME
J803 OR J903
J802 OR J902
AUDIO ACCESSORY CONNECTORS
SINGLE CORD OR
LONGER CORD, IF DOUBLE CONNECTORS (YELLOW BAND)
SHORTER CORD, IF DOUBLE CONNECTORS

4 Release the audio accessory push-to-talk switch or the CVC helmet or H-161/GR audio accessory switch to hear the reply.

5 Adjust the VOLUME control for a comfortable listening level.

D TO COMMUNICATE OVER THE INTERCOM

1 Set the MONITOR switch to:

a. INT only if the audio accessory is connected to J802 on the C-2298/VRC or J902 on the C-2297/VRC..

b. ALL, A, INT ONLY, or B if the audio accessory is connected to J902 on the C-2298/VRC or J903 on the C-2297/VRC.

2 Set the C-2297/VRC SIG switch to OFF.

3 Press the audio accessory push-to-talk switch and speak into the microphone.

OR

Set the CVC helmet or H-161/GR audio accessory switch to INTERCOM and speak into the microphone. The switch will lock into this position.

4 Release the audio accessory push-to-talk switch to hear the reply. It is not necessary to return the CVC helmet or H-161/GR audio accessory switch to the OFF position.

5 Adjust the VOLUME control for a comfortable listening level.

NOTE

Set the CVC helmet or H-161/GR audio accessory switch to OFF when not communicating over the intercom. LEAVING THE AUDIO ACCESSORY SWITCH IN THE INTERCOM POSITION WILL PREVENT OTHER CREW MEMBERS FROM USING THE RADIO.

E TO COMMUNICATE WITH PERSONNEL OUTSIDE THE VEHICLE

These instructions apply when communicating with either the operator of the C-2296/VRC (*see the next page*), or with someone using a telephone connected to the LINE binding posts of the AM-1780/VRC.

These instructions apply when communicating with either the operator of the C-2296/VRC (*see the next page*), or with someone using a telephone connected to the LINE binding posts of the AM-1780/VRC.

1 Set the MONITOR switch to ALL. The crew commander can set the MONITOR switch on the commander's control box to C.

2 Set the C-2297/VRC SIG switch to:

a. SIG to signal the C-2296/VRC user. Hold this switch in this position to continue signaling the C-2296/VRC user.

b. EXT to communicate with either the C-2296/VRC user or the user of the telephone connected to the AM-1780.

3 Press the audio accessory push-to-talk switch and speak into the microphone.

OR

Set the CVC helmet or H-161/GR audio accessory switch to INTERCOM and speak into the microphone.

4 Release the audio accessory push-to-talk switch to return the CVC helmet or H-161/GR accessory switch to OFF to hear the reply.

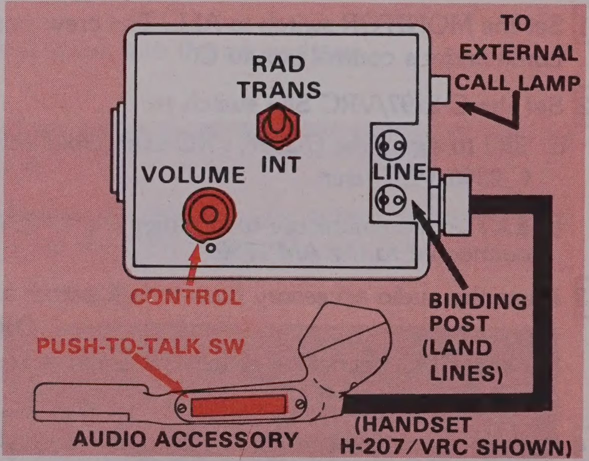
5 Adjust the VOLUME control for a comfortable listening level.

COMMUNICATIONS FROM OUTSIDE THE VEHICLE USING THE C-2296/VRC CONTROL BOX

The C-2296/VRC control box is mounted on the outside of the vehicle. It is normally equipped with a handset and an external call lamp. The handset is used to communicate over the radio and with personnel inside the vehicle. The call lamp indicates when someone inside the vehicle is signaling the person outside the vehicle.

A TO COMMUNICATE WITH PERSONNEL INSIDE THE VEHICLE

1. Press the push-to-talk switch on the audio accessory to signal the personnel inside the vehicle.
2. Release the push-to-talk switch to hear the reply. You must release this switch before the personnel inside the vehicle can answer your call.
3. Press the push-to-talk switch on the audio accessory and speak into the microphone.
4. Release the push-to-talk switch to hear the reply.


TO EXTERNAL CALL LAMP
RAD
TRANS
INT
VOLUME
LINE
CONTROL
PUSH-TO-TALK SW
BINDING POST (LAND LINES)
AUDIO ACCESSORY
(HANDSET H-207/VRC SHOWN)

5. Adjust the VOLUME control for a comfortable listening level.

TO COMMUNICATE OVER THE RADIO

1 Request the operator inside the vehicle to set the C-2297/VRC MONITOR switch to the position of the radio over which you wish to transmit.

2 Press the push-to-talk switch on the handset while holding the RAD TRANS-INT switch in the RAD TRANS position.

3 Speak into the microphone.

4 Release the push-to-talk switch and the RAD TRANS-INT switch to hear the reply.

C TO COMMUNICATE WITH PERSONNEL INSIDE THE VEHICLE FROM A FIELD TELEPHONE

1 Establish communications with personnel inside the vehicle *(page 2-38)*.

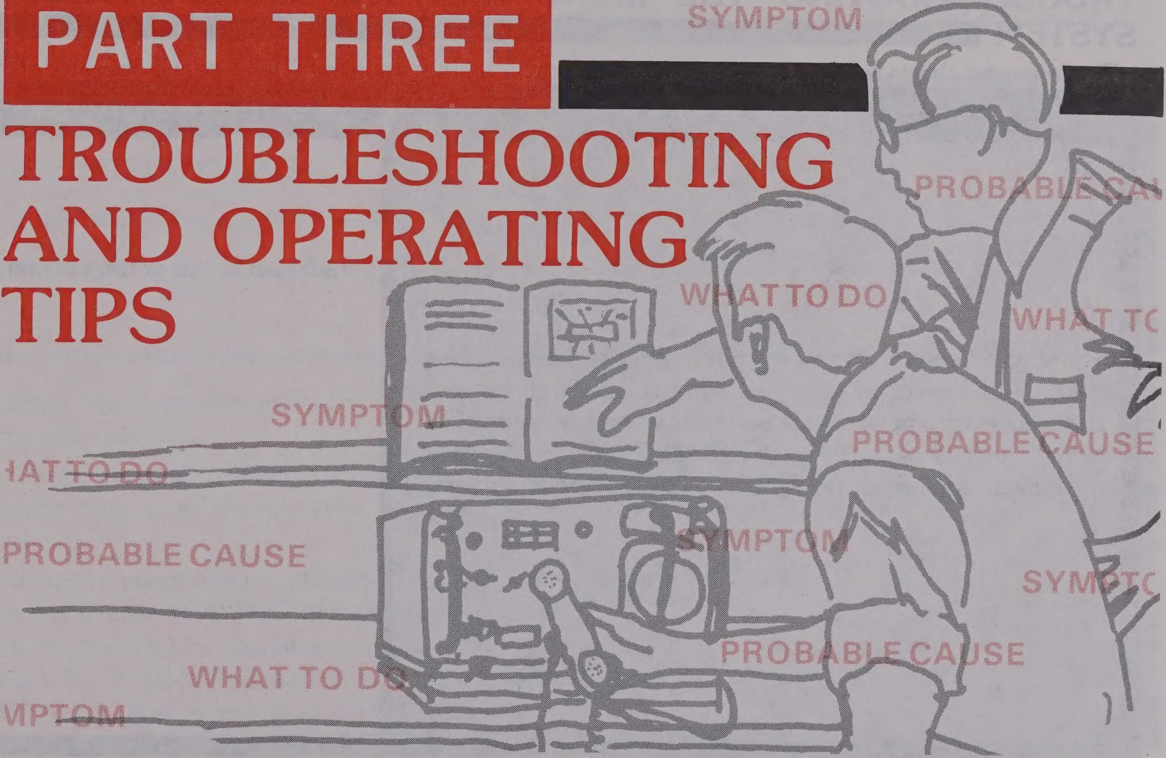
2 Connect the field telephone to the LINE binding posts on the C-2296/VRC.

3 Communicate with the personnel inside the vehicle on a push-to-talk basis.

Operating instructions are great; but what happens if you (the operator) cannot get the set on the air or cannot receive. You need some kind of troubleshooting or operating tips to see you through. That's what **PART III** is all about.

PART THREE

TROUBLESHOOTING AND OPERATING TIPS


SYMPTOM
PROBABLE CA
WHAT TO DO
WHAT TC
SYMPTOM
PROBABLE CAUSE
HAT TO DO
PROBABLE CAUSE
SYMPTOM
SYMPTC
PROBABLE CAUSE
WHAT TO DO
MPTOM

TROUBLESHOOTING THE RADIO AND THE RADIO-INTERCOM SYSTEM

The following charts tell you how to identify and correct minor equipment failures and operator errors

SYMPTOM	PROBABLE CAUSE
There is no sound coming from the radio set. The receiver-transmitter blower motor does not run when you press the audio accessory push-to-talk switch or when you set the CVC helmet audio accessory switch to RADIO. The dial lamps and the indicator lamps do not light when the equipment is turned on.	Radio set is not getting power.

that commonly cause communications problems with AN/VRC-12 series radios. The suggested corrective measures can be performed by the operator without using any tools or test equipment; if they do not correct the situation, request organizational maintenance.

WHAT TO DO

MAKE THE FOLLOWING CHECKS:

1. If the vehicle has a master switch, check to see that it is on.

2. Set the receiver-transmitter POWER switch to OFF BREAKER RESET. then back to LOW.

OR

If the problem is with the radio receiver only, set the radio receiver POWER switch to ON RESET.

3. Push the receiver-transmitter or radio receiver back fully onto its mount and tighten the mounting clamps.

4. Check the radio power cable connections at the vehicle battery for tight connection and to see that the cable wires are connected to the proper terminals (red-white to positive and blue-green to negative).

5. If the Frequency Selector Control C-2742/VRC is being used with the RT-246/VRC, check to see that the C-2742/VRC PWR switch is *not* set to OFF.

6. If the AN/VIC-1 radio-intercom system is connected to the radio set, check to see that the AM-1780/VRC MAIN PWR switch is set to NORM. Also check to see that the AM-1780/VRC INSTALLATION switch is set to OTHER.

SYMPTOM	PROBABLE CAUSE
You cannot hear a rushing noise with the SQUELCH switch set to OFF. The blower motor runs, but you cannot hear sidetone with the audio accessory push-to-talk switch depressed, or with the CVC helmet H-161/GR audio accessory switch set to RADIO.	Audio accessory or loudspeaker defective or improperly connected.
The blower motor does not run when you press the audio accessory push-to-talk switch, or when you set the CVC helmet or H-161/GR audio accessory switch to RADIO.	a. Defective audio accessory. b. The CVC helmet or H-161/GR cables are improperly connected to the crew member control box. c. The receiver-transmitter X-Mode receptacle cover is not locked on its receptacle.
The blower motor continues to run when you release the audio accessory push-to-talk switch or CVC helmet audio accessory switch.	Defective audio accessory.
Your radio set appears to be operating properly, but you are unable to communicate.	The radio set is not tuned to the proper frequency.

WHAT TO DO

1. Change the audio accessory to another audio receptacle. (SPKR or RETRANSMIT R/W)
2. Use another audio accessory or loudspeaker.

1. Change the audio accessory to another receptacle or use another audio accessory.
2. Connect the longer cable to the left receptacle on the crew member control box and the shorter cable to the right receptacle on the crew member control box.
3. Lock the X-Mode receptacle cover on its receptacle on the receiver-transmitter.

Replace the audio accessory.

MAKE THE FOLLOWING CHECKS:

1. Check to see that the assigned frequency appears in the reciever-transmitter dial window.
2. Attempt a communications check with a nearby radio.
3. Change the tuning controls to another frequency, then back to the assigned frequency.
4. Attempt to establish communications on an alternate frequency.

SYMPTOM	PROBABLE CAUSE
Your radio set appears to be operating properly but you are unable to communicate.	Defective whip antenna system.
You are unable to communicate over the radio from an audio accessory connected to the C-2299/VRC.	a. The C-2299/VRC RETRANS switch is set to ON. b. The C-2299/VRC RAD TRANS switch is set to the wrong position.
You are unable to establish automatic retransmission. The RETRANS switch is set to ON and both receiver-transmitters are in the SQUELCH mode.	a. Cables are connected incorrectly or connectors are loose. b. One of the receiver-transmitters is defective.

WHAT TO DO

MAKE THE FOLLOWING CHECKS:

1. Check the band control switch on the bottom of the antenna matching unit. It should have automatically positioned itself to the band that includes the first two digits (MHz) of the operating frequency. If it has not, set the switch manually by turning the pointer until it points to the appropriate band.
2. Check the tightness of the antenna cables at the radio and the antenna matching unit. (See the cabling diagram for your set.)
3. Check to see that both whip antenna sections are fully screwed to each other and to the top of the antenna matching unit.

---

a. Set the C-2299/VRC RETRANS switch to OFF unless establishing automatic retransmission between two other radio stations.

b. Set the C-2299/VRC RAD TRANS switch to 1 to control a receiver-transmitter connected to the left side of the C-2299/VRC or to position 2 to communicate with a receiver-transmitter connected to the right side of the C-2299/VRC.

---

a. Check the cabling diagram for your set to insure that cables are connected correctly and check connections for tightness.

b. Connect the audio accessory to each receiver-transmitter and attempt to establish satisfactory squelch mode communications with each distant station. If receiver-transmitter is defective, request organizational maintenance.

TROUBLESHOOTING THE RADIO-INTERCOM SYSTEM

SYMPTOM	PROBABLE CAUSE
AM-1780/VRC POWER indicator lamp does not light, indicating that there is no power available at the radio-intercom system. The MAIN PWR switch is set to NORM and the INSTALLATION switch is set to OTHER.	a. AM-1780/VRC POWER CKT BKR switch is set to OFF. b. AM-1780/VRC POWER indicator lens is set to blackout position. (*Rotated to the left.*) c. Power is not available from the associated receiver-transmitter. d. Cable connections are loose.
You are unable to communicate over the radio or radio-intercom system from an audio accessory connected to a crew member control.	a. Audio accessory is defective or connected incorrectly. b. Cabling is incorrect or cable connectors are loose.

WHAT TO DO

1. Set the AM-1780/VRC POWER CKT BKR switch to ON.

2. Rotate the AM-1780/VRC POWER indicator lens to the right.

3. Set the associated receiver-transmitter POWER switch to LOW or HIGH and check the receiver-transmitter for normal operation. Troubleshoot the receiver-transmitter if it does not function properly.

4. Check the cabling between the AM-1780/VRC and the receiver-transmitter.

1. Make the following checks:
    a. Check to see that the audio accessory cable connector is in good condition and locked into its receptacle.
    b. If you are using the CVC helmet or H-161/GR, check to make sure that the longer cord is connected to the left receptacle and the shorter cord is connected to the right receptacle of the crew member control box.
    c. Check the bail out connector on the CVC helmet or H-161/GR cable to insure that the connection is tight and that no contacts are broken.
    d. Connect the audio accessory to another control box.
    e. Use another accessory that you know is good.

2. Check the radio-intercom system to insure that cabling is correct and cable connections are tight. *(See cabling diagram on page 2-30.)*

SYMPTOM	PROBABLE CAUSE
You are unable to communicate over the radio from an audio accessory connected to a crew member control box. You can communicate over the intercom. You can communicate over the radio from the audio accessory connected directly to the receiver-transmitter.	a. Another crew member's CVC helmet audio accessory switch is set at INTERCOM.
	b. Another crew member is pressing the push-to-talk switch of an audio accessory connected to the intercom receptacle of the control box.
	c. The control box MONITOR switch is set to the wrong position.
	d. AM-1780/VRC RAD TRANS switch is set to LISTENING SILENCE.
	e. AM-1780/VRC INSTALLATION switch is set to RETRANS.
You are unable to communicate over the radio or the intercom from the C-2296/VRC control box outside the vehicle. You can communicate from the other crew member control boxes.	Switches on the C-2297/VRC control box are not set properly.

WHAT TO DO

1. Have the other crew members set their CVC helmet audio accessory switches to OFF.

2. Have the other crew members release the push-to-talk switches on their audio accessories.

3. Check the MONITOR switch on your control box. Make sure that it is set to the correct position for the receiver-transmitter you want to use. (*See the operating instructions on page 2-33.*)

4. Set the AM-1780/VRC RAD TRANS switch to CDR + CREW or CDR ONLY as appropriate. (*See page 2-29.*)

5. Set the AM-1780/VRC INSTALLATION switch to OTHER.

Set the C-2297/VRC MONITOR switch to ALL and SIG switch to EXT.

OPERATING TIPS

The following information is presented to help you to solve communications problems caused by other than equipment failure or operator error. If you used the proper operating procedures and there is no trouble with your equipment but you still cannot communicate satisfactorily, then check out these operating tips.

1. Your inability to communicate or poor communications may be caused by:

   Too great a distance between radio sets.

   Poor choice of location at one or both stations.

   Terrain (*hills or mountains*).

   Noise and interference from:

   - Friendly sources: generators, power lines, other sources of electrical energy.
   - Enemy sources: jamming. *(Refer to TC 32-11, How to Get out of a Jam.)*
   - Faulty antenna (*construction or positioning*).

2. Set the SQUELCH switch on your radio to OFF (*NEW or OLD*).

NOTE

Too great a distance between two radio sets or two radio sets operating in different squelch modes will cause one station or the other or both not to be able to receive. THESE ARE TWO OF THE MOST COMMON PROBLEMS ENCOUNTERED IN TACTICAL RADIO NETS. If you set your SQUELCH switch to OFF (*NEW or OLD*), it will increase the distance over which you can receive. It will also allow you to better transmit to and to receive from the distant station regardless of what squelch mode it is operating in.

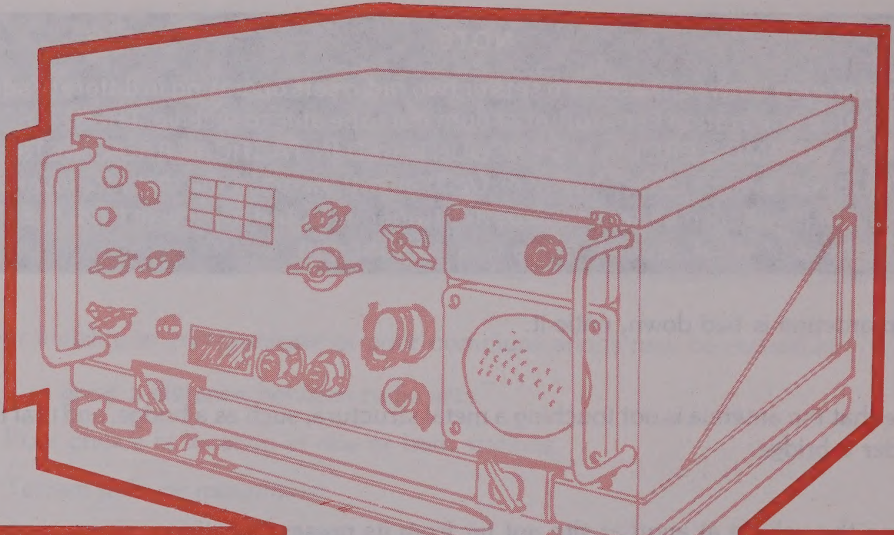
3. If the whip antenna is tied down, untie it.

4. Make sure that the antenna is not touching a metal structure, such as a bridge, and that the vehicle is not under a bridge.

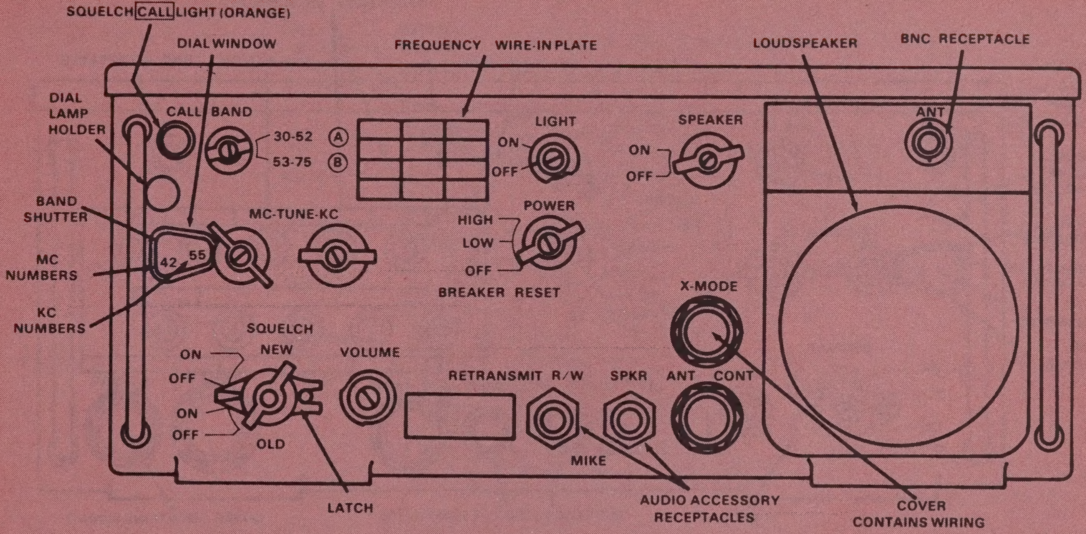
5. Try locating the vehicle at another site not far from its present location.

6. If the incoming signal is weak, use a headset rather than a loudspeaker.

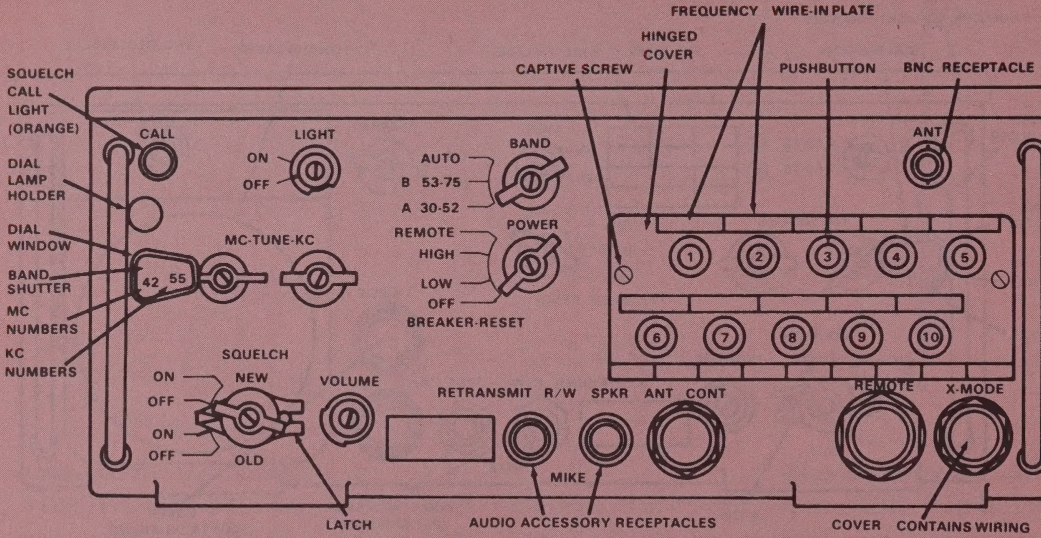
7. Set the POWER switch to HIGH. This will increase your transmitting distance from 8 to approximately 41 kilometers. It has no effect on your received radio signals.



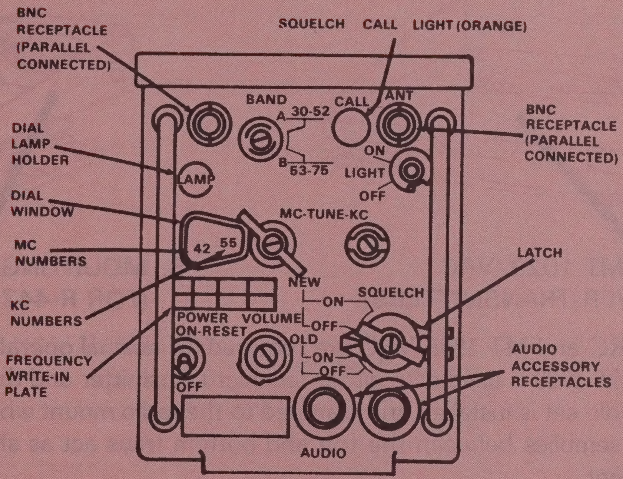
This training circular was written with you, the operator, in mind. We have progressed from the description to operating instructions and finally to troubleshooting and operating tips for the AN/VRC-12 family of radio sets. If you use this TC with TM 11-5820-401-12 you will start with a solid base on which to build your experience.


SQUELCH CALL LIGHT (ORANGE)
DIAL WINDOW
FREQUENCY WIRE-IN PLATE
LOUDSPEAKER
BNC RECEPTACLE
DIAL LAMP HOLDER
CALL
BAND
30-52
Ⓐ
53-75
Ⓑ
LIGHT
ON
OFF
SPEAKER
ON
OFF
ANT
BAND SHUTTER
MC-TUNE-KC
POWER
HIGH
LOW
OFF
MC NUMBERS
42
55
BREAKER RESET
X-MODE
KC NUMBERS
SQUELCH
NEW
VOLUME
ON
OFF
ON
OFF
OLD
RETRANSMIT
R/W
SPKR
ANT
CONT
MIKE
LATCH
AUDIO ACCESSORY RECEPTACLES
COVER CONTAINS WIRING

RECEIVER-TRANSMITTER RT-524/VRC

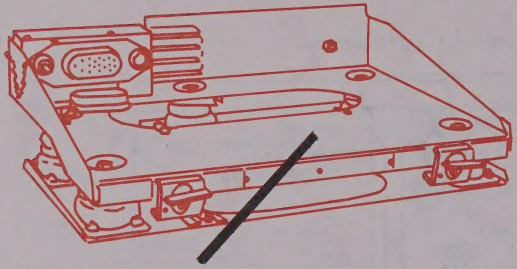

FREQUENCY WIRE-IN PLATE
HINGED COVER
CAPTIVE SCREW
PUSHBUTTON
BNC RECEPTACLE
SQUELCH CALL LIGHT (ORANGE)
CALL
LIGHT
ON
OFF
BAND
AUTO
B 53-75
A 30-52
ANT
DIAL LAMP HOLDER
DIAL WINDOW
MC-TUNE-KC
REMOTE
HIGH
LOW
OFF
POWER
BREAKER-RESET
BAND SHUTTER
42
55
MC NUMBERS
KC NUMBERS
1
2
3
4
5
6
7
8
9
10
SQUELCH
NEW
ON
OFF
ON
OFF
OLD
VOLUME
RETRANSMIT
R/W
SPKR
ANT
CONT
REMOTE
X-MODE
MIKE
LATCH
AUDIO ACCESSORY RECEPTACLES
COVER
CONTAINS WIRING

RECEIVER-TRANSMITTER RT-246/VRC

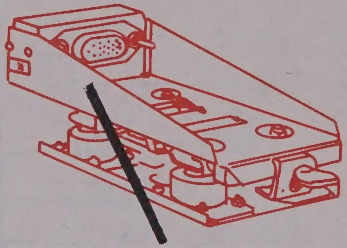

BNC RECEPTACLE (PARALLEL CONNECTED)
SQUELCH CALL LIGHT (ORANGE)
BAND
A 30-52
B 53-75
CALL
ANT
BNC RECEPTACLE (PARALLEL CONNECTED)
DIAL LAMP HOLDER
LAMP
ON
LIGHT
OFF
DIAL WINDOW
MC-TUNE-KC
MC NUMBERS
42
55
LATCH
NEW
ON
SQUELCH
KC NUMBERS
POWER ON-RESET
VOLUME
OFF
OLD
ON
OFF
FREQUENCY WRITE-IN PLATE
OFF
AUDIO ACCESSORY RECEPTACLES
AUDIO

RADIO RECEIVER R-442/VRC

Mountings MT-1029/VRC and MT-1898/VRC.



A. MOUNTING MT-1029/VRC
(FOR RECEIVER-TRANSMITTERS).



B. MOUNTING MT-1898/VRC
(FOR R-442/VRC)

Mountings MT-1029/VRC and MT 1898/VRC are required for normal operation of the AN/VRC-12 series radio sets. The MT-1029 is used with either receiver-transmitter and the MT-1898 is used with the R-442/VRC. The radio set is installed and clamped to the radio mount which, in turn, is bolted to the vehicle. Isolator assemblies between the top and bottom trays act as shock absorbers for the mounted radio equipment.

Each radio mount has an 18-pin receptacle which mates with a plug on the rear of the radio set. This receptacle allows passage of both the operating power and the transmitted and received audio signals between the radio set and auxiliary equipment, such as a radio-intercom system or the Transmission Control Box, C-2299/VRC. The mount also has receptacles for connection for power cables and control cables to auxiliary equipment. An integral 100-ampere fuse provides protection for the vehicle's electrical system against electrical shorts or grounds in the mount or radio set.

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PLEASE SEND US YOUR COMMENTS!
THANKS

COMMENTS ....

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How can we contact you for more information on your comments?

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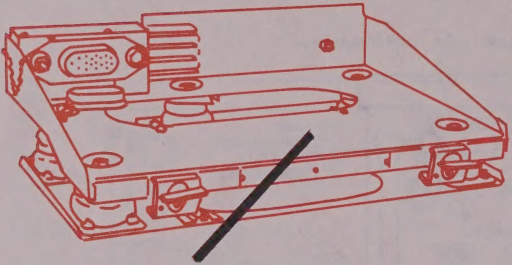
RANK NAME DUTY POSITION DUTY STATION AUTOVON NUMBER

Mountings MT-1029/VRC and MT-1898/VRC.



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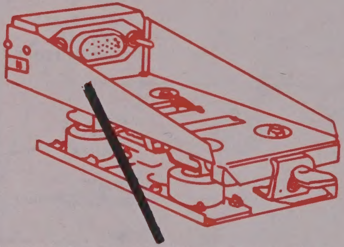

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TC 11-4

8 APRIL 1977

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

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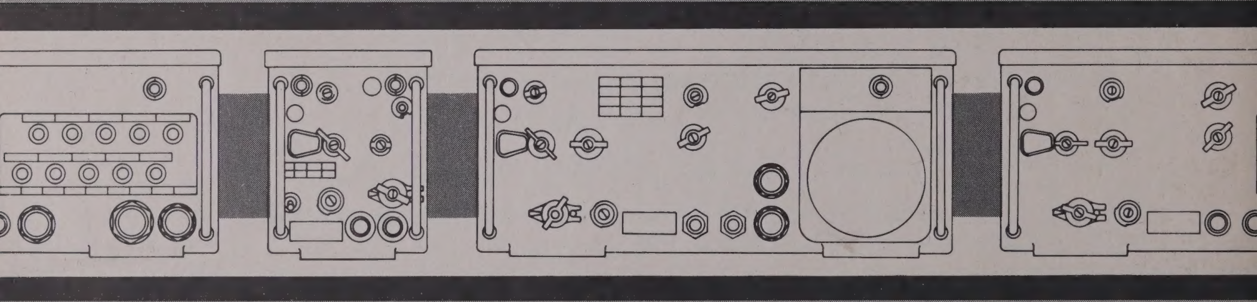
HANDBOOK FOR AN/VRC-12



SERIES OF RADIO SETS

PIN: 015664-000